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Examining e-extension: diffusion, disruption, and rate of adoption among Iowa State University Extension and Outreach professionals

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Examining e-extension: diffusion, disruption, and rate of adoption among Iowa State University Extension and Outreach professionals

by

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DEDICATION

This dissertation is dedicated to the Iowa 4-H Youth Development program,
which instilled in me the lifelong skill of continuing to set new goals
and work hard to achieve them, long after my years as a
4-H member came to an end.

I also dedicate this research to my great-grandmother,
Lorena Gabel, who would remind me that:
"No one can ever take your education away from you."

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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ABSTRACT

The purpose of this study was to assess the perceptions of eXtension held by Iowa Extension professionals and their rate of adoption of the online resource using Rogers's (2003) diffusion of innovations theory and Christensen's (1997) disruptive innovation theory. Specifically, the study looked at Iowa Extension professionals' perceptions and stage of adoption of eXtension. The study also examined the relationship among Iowa Extension professionals' background characteristics and their perceptions of the online resource in addition to whether respondents' perceptions of eXtension predicted stage of adoption. A census survey was disseminated to 975 Iowa State University Extension and Outreach professionals. A final response rate of 44% (*n*=429) was obtained and included the respondents from the pilot study.

The highest number of respondents reported that they were familiar with eXtension—persuasion stage and third stage of adoption (*n*=139, 32.63%). One quarter of the respondents remained at the no knowledge stage of eXtension (*n*=109, 25.59%), 16% of respondents were at the knowledge stage (*n*=68), less than 1% were at the decision stage (*n*=3), 15% were at the implementation stage (*n*=65), and 10% were at the highest stage of confirmation (*n*=42). 75% of Iowa Extension professionals indicated have made a decision to use or not use eXtension in their work.

Respondents were shown to have more favorable perceptions of eXtension's perceived relative advantage, accessibility and capacity attributes, while the compatibility, complexity, observability, trialability, affordability, responsiveness, and customization attributes were neutrally perceived. In addition, eXtension was perceived to exhibit only two of the disruptive innovation attributes (accessibility and capacity). The technology was

perceived to lack the degree of affordability, responsiveness and customization needed to become a disruptive innovation.

As respondents' age, educational attainment and years of employment in Cooperative Extension increased, their perceived trialability of eXtension was also shown to increase. In addition, the perceived attributes of eXtension explained 26% of the variance in membership at one of two levels of adoption—the higher level of adoption or lower level of awareness. The complexity, trialability and customization attributes were shown to have a statistically significant influence on predicting the odds of attaining the higher level of adoption of eXtension.

CHAPTER 1. INTRODUCTION

Iowa State University Extension and Outreach has been actively providing research-based learning to improve the quality of life for Iowans for more than a century. In recent decades, the widespread proliferation of Internet technologies have provided new opportunities for the delivery of education and training offered through Cooperative Extension. Online learning is now a portable and flexible delivery method for Extension professionals and clientele alike to obtain information resources (Lee, 2008; Ferrer et al., 2004; Folorunso et al., 2008).

Today's Cooperative Extension organization has a strong resemblance to its historical roots even as the organization celebrates 100 years of providing educational outreach to youth, families, businesses and communities across the U.S. The founding mission of extension—using objective, research-based information to serve the public—still remains true (Eddy, 1957). The work of Cooperative Extension still continues to connect the citizens of its state with research-based information from the local land-grant institution.

The trademark of Cooperative Extension has always been to provide ongoing educational outreach and support to the communities and individuals it serves. The traditional Extension outreach model consists of county, regional and state Extension specialists living and working in a community to disseminate resources to clientele to strengthen communities, families and businesses. The Norman Rockwell painting titled, "The County Agent" is often an image that comes to mind when reflecting on the longstanding work of Cooperative Extension and the educational outreach it delivers to the public (Rasmussen, 1989). The 1948 painting depicts a county Extension agent providing practical

education at the farm of a young 4-H'er and her family as the agent teaches the 4-H member about her calf project. Sixty-six years since Rockwell's "County Agent" debuted, Cooperative Extension remains committed to providing practical, research-based information and support to the citizens of its state. Yet, if Norman Rockwell were to create an image that portrays the roles and responsibilities of today's county agent, the painting would no longer look the same.

Our current Cooperative Extension system must now also take into consideration a broader scope of societal, global and demographic clientele needs. The United States and its citizens have evolved since the early 20th century when Extension was reaching targeted agricultural audiences throughout the country. At the turn of the twentieth century, 60% of the country's 76 million citizens were living in rural areas. During that same time, only 7% of the public held high school degrees. In addition, approximately 42% of Americans were employed in the agricultural sector, which providing the labor force necessary to run the 5.7 million farms that existed at that time (West et al., 2009).

The last century has brought about rapid change to Cooperative Extension as the organization strives to meet the increased educational needs of citizens, while facing reduced budgets and shifts in programming to further align with state and national priorities. These dilemmas have challenged the mission, values and beliefs of Cooperative Extension. Yet, Extension is a long-established organization that was founded on the idea of embracing change and new ideas (Seevers & Graham, 2012). The organization must conduct routine updates such as readapting delivery methods and outreach efforts to provide learning that is relevant, engaging and easily accessible for the next 100 years of service. Even when faced with updates, Cooperative Extension remains committed to delivering on the intent of its

founding mission of providing research-based information that is reflective of the current economic and social issues facing clientele.

Today's Cooperative Extension system continues to provide research-based knowledge and informational resources to agricultural audiences through extension specialists, state and local extension offices and online resources (Bull et al, 2004). The organization's clientele have expanded over time to also include businesses, families, youth, and rural as well as urban audiences. As Cooperative Extension continues to focus more of its time and effort toward reaching more urban-based audiences, the organization is broadening its outreach to include programs that fulfill the needs of both rural and urban households and communities in a variety of areas, including agriculture and natural resources, youth development, family and consumer sciences, and community development (Diekmann et al., 2012). These audiences and targeted markets will continue to evolve based upon the needs and geographic migration of clientele. Extension has truly only tapped the surface of potential audiences that can be served.

Even as audiences and topic areas within Extension continue to expand, the organization is faced with the financial strain of trying to serve the needs of a variety of clientele groups with a fixed or declining budget. Funding for Cooperative Extension originally came from federal resources allocated through the Smith-Lever Act of 1914 and then matched by states involved in the developing local land-grant institutions (U.S. Department of Agriculture, 2009). The funding of Extension is now also provided through state, county and external resources to support a decreasing and at times, stagnant source of federal funding (Bennett, 2011).

In recent years, Cooperative Extension has been working to broaden its engagement and economic efficiency by creating an Extension system that utilizes more online learning and educational technologies to replace Extension's supply-oriented distribution system with a demand-oriented system that can deliver content anytime and at anyplace using Internet-based resources (King & Boehlje, 2000). In order for Extension to stay relevant in a technologically dependent world, the organization must embrace innovative and efficient methods of educational outreach. Since the rise of the Internet age, conducting educational outreach via online technologies has become an effective and now crucial delivery method for reaching Cooperative Extension clientele in the 21st century.

eXtension—*America's Research-based Learning Network*™, is one online resource that has been developed to provide greater online presence for Cooperative Extension. The national eXtension initiative is the online national Cooperative Extension information delivery system. It combines the efforts of U.S. land-grant institutions to provide a single access point to research-based, peer-reviewed educational materials developed by Extension faculty and staff across the nation (eXtension, 2014). The vision for the eXtension initiative was developed by an Extension Committee on Organization and Policy (ECOP) policy task force in 2001 (D. Cotton, personal communication, December 18, 2014). The ECOP spearheaded the movement to develop a stronger online presence and increase research-based information available to Extension clientele.

eXtension today is an online resource and that provides knowledge seekers and providers alike with an interactive learning environment that disseminates credible expertise from Extension professionals; reliable information based upon relevant research and timely information from participating land-grant institutions across the U.S. eXtension is a virtual

meeting place where university content providers can gather to produce and obtain new educational resources on wide-ranging topics such as agricultural disaster preparedness, child care, and financial education that is relevant to today's educational needs of Extension professionals and clientele (About eXtension, 2014).

eXtension is just one form of online education that could be instrumental in advancing Extension programs and extending the reach of the organization. Yet, the current understanding of how the eXtension technology is used as a method for research-based educational outreach among professionals within Cooperative Extension is limited. Since the establishment of eXtension, limited research has been conducted on the perceptions and use of the technology (Harder, 2007; Kelsey, Stafne, Greer, 2011; Xu & Kelsey, 2012, Harder & Lindner, 2008), particularly among Iowa State University Extension and Outreach professionals. Further research is needed to understand how eXtension is adopted, used and perceived among Extension professional populations in Iowa and across the U.S.

Statement of the Problem

Six years since the official launch of www.eXtension.org, the online technology has not been adopted and utilized by Extension professionals and clientele across the U.S. to the extent that eXtension founders envisioned it would. Millions of dollars have been and continue to be invested in eXtension (Harder 2007), which has some state Extension systems questioning the financial sustainability and future of the technology (King and Boehlje, 2013). How the influx of new technologies, particularly eXtension, over the last decade are being accepted or rejected by Extension professionals have yet to be examined in the state of

Iowa. Understanding the mindset and culture of Iowa Extension professionals is the key to providing an online learning environment that is relevant, engaging and valuable to users.

Research Objectives

The purpose of this study was to assess the perceptions held by Iowa Extension professionals and rate of adoption of eXtension using Rogers's (2003) Diffusion of Innovations theory and Christensen's (1997) disruptive innovation theory. This study was conducted according to the following the objectives:

1. Describe the background characteristics of Iowa State University Extension and Outreach professionals.
2. Describe Iowa State University Extension and Outreach professionals' current stage in the innovation-decision process of eXtension, based upon Li's adaptation of Rogers' (2003) stages in the innovation-decision process (no knowledge, knowledge, persuasion, decision, implementation, and confirmation).
3. Describe Iowa State University Extension and Outreach professionals' perceptions of eXtension based upon Rogers's (2003) characteristics of an innovation (relative advantage, compatibility, observability, complexity, and trialability).
4. Describe Iowa State University Extension and Outreach professionals' perceptions of eXtension based on Christensen's (1997) characteristics of a disruptive innovation (affordability, accessibility, capacity, responsiveness, simplicity or customization).
5. Describe the correlation between Iowa State University Extension and Outreach professionals' selected background characteristics (age, gender, education, educational attainment, and years of employment in Cooperative Extension) and their perceptions of eXtension based on the diffusion of innovations theory (Rogers, 2003) and the disruptive innovation theory (Christensen, 1997).
6. Determine whether Iowa State University Extension and Outreach professionals' perceptions of eXtension based upon Rogers's (2003) and Christensen's (1997) characteristics of an innovation predict the stage of adoption in Rogers's (2003) innovation-decision process.

Significance of the Study

Iowa State University Extension and Outreach professionals' acceptance of eXtension must be examined to understand how Cooperative Extension can effectively adopt and diffuse online learning both now and into the future. Understanding these perceptions will aid in the development of successful technology-based learning that will enhance the overall quality of communications and education for Iowa's Extension and Outreach organization.

Adopting eXtension programming requires Extension professionals to adapt their personalized outreach and delivery strategies. The use of eXtension alters the level of programming independence most Cooperative Extension professionals are used to by focusing on a national initiative, rather than locally developed outreach efforts. Consequently, Iowa State University Extension and Outreach professionals may not be accepting of eXtension programming based upon their assumptions or perceptions formed after using eXtension. Understanding how Extension professionals use web-based technologies, such as eXtension, to strengthen professional development, collaboration with other professionals, and to conduct educational outreach will be key in strengthening the delivery of information that is relevant for 21st century clientele.

This study analyzed Extension professionals' perceptions of the relative advantage, compatibility, complexity, trialability and observability of eXtension (Rogers, 2003) in addition to eXtension's potential to become a disruptive innovation for Cooperative Extension by assessing the affordability, accessibility, capacity, responsiveness, and customization of the technology (Franz & Cox, 2012, Christensen, Anthony, & Roth, 2004; Christensen, 1997). This critical examination of eXtension will provide the knowledge base

required to develop and deliver online instructional methods that best meet the needs of Iowa's Extension and Outreach clientele, faculty and staff in the 21st century.

A current void exists in the literature regarding Iowa Extension professionals' current perceptions and adoption of eXtension. Understanding the mindset and online learning perceptions of the Iowa Extension professionals will advance the development of successful technology-based learning to enhance the quality of communications, education, and access to research-based information through Iowa State University Extension and Outreach.

Limitations

The study was conducted with the following limitations:

- Innovation: The study was focused on the use of a technology within Cooperative Extension, in which study participants may or may not have been completely familiar with the innovation. Thus, participants may have been still developing their understanding and perceptions of eXtension at the time of the study.
- Participants: The study was limited to analyzing the perceptions of just Iowa State University Extension and Outreach professionals. The results may not be generalizable to Extension professionals in other states. The population for the study was identified based on all Iowa State University Extension and Outreach faculty and staff listed in the ISU Extension and Outreach employee directory. This method of population selection may have included irrelevant participants, ultimately weakening internal validity of the study. It was also assumed that the Iowa Extension and Outreach professionals were truthful and open in their responses to the online questionnaire.

- Measurement: Limitations exist in the timing and the nature of the measurement. In general, the instrument was administered after the participants' initial acceptance or rejection of the eXtension rather than during the active adoption decision-making process (Venkatesh et al., 2003). It should also be noted that the findings of this study should only be applied to this unique population and environment in Iowa. The conclusions must be carefully evaluated before any attempt is made to predict these same findings on other state Extension settings. In addition, professionals in other Extension systems may not be utilizing eXtension in their work and would therefore exhibit different model analyses and outcomes than this study's participant pool.

Delimitations

The study was conducted with the following delimitations:

- The population was delimited to Iowa State University Extension and Outreach professionals.
- The study is delimited to analyzing eleven specific constructs: Iowa State University Extension and Outreach professionals' perceived relative advantage, compatibility, complexity, observability, trialability, affordability, accessibility, capacity, responsiveness, simplicity, and customization.

Definition of Terms

The following terms and acronyms were used in this study:

Compatibility: *"*...the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and the needs of potential adopters." (Rogers, 2003. p. 240.)

Complexity: "…the degree to which an innovation is perceived as difficult to understand and use" Rogers, 2003. p. 257.)

CSREES: Cooperative State Research, Extension and Education Service

Disruptive Innovation: An innovation that creates a new market and value network, and eventually disrupts an existing market and value network, displacing an earlier technology (Christensen, 1997).

ECOP: Extension Committee on Organization and Policy

eXtension: The eXtension program is the online national Cooperative Extension information delivery system. It combines the efforts of land grant universities to provide a single access point to research-based, peer-reviewed educational materials developed by Extension faculty across the nation (eXtension, 2012).

Iowa State University Extension and Outreach Professional: All faculty and staff employed by Iowa State University Extension and Outreach as identified in the ISU Extension and Outreach directory as the target population for this study. This population consisted of all Iowa State University Extension and Outreach state as well as county-employed staff members, which also included administrative and office assistant-type positions due to the possibility of using eXtension in their work.

Innovation: An idea, practice or object that is perceived as new by an individual or other unit of adoption (Rogers, 2003)

Innovation-Decision Process: "…the process through which an individual passes from first knowledge of an innovation to the formation of an attitude toward the innovation, to a decision to adopt or reject, to implementation and use of the new idea, and to confirmation of this decision." The innovation-decision process is known as five main steps: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. (Rogers, 2003, p.20).

No Knowledge: "…when potential adopters have no knowledge about the innovation at the very beginning of their adoption behavior" (Li, 2004, p. 170).

Observability: "…the degree to which the results of an innovation are visible to others" (Rogers, 2003, p. 258).

Relative Advantage: "…the degree to which an innovation is perceived as better than the idea it supersedes" (Rogers, 2003, p. 229).

Trialability: "…the degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003, p. 258).

CHAPTER 2. LITERATURE REVIEW

The literature review provides a synopsis of the current research on the perceptions, adoption and diffusion of online technologies within Cooperative Extension. The review also includes sections focused on (a) the theoretical framework to guide the study, (b) a history of Extension in Iowa, (c) the scholarship of Cooperative Extension, (d) the history of eXtension, (e) the current state of eXtension, and (f) the future of eXtension.

Theoretical Framework

The diffusion of innovations theory (Rogers, 2003) and disruptive innovation theory (Christensen, 1997) provide the theoretical framework to guide the study and assess the perceptions, acceptance and value of eXtension among Iowa State University Extension and Outreach professionals. Rogers's diffusion of innovations theory was used to determine Iowa Extension professionals' current stage in the innovation-decision process—knowledge, persuasion, decision, implementation, or confirmation (Rogers, 2003). Harder's 2007 study of eXtension adoption by Texas Extension agents proposed a sixth stage (no knowledge) in the innovation-decision process (first implemented by Li, 2004) to include individuals who had no knowledge of the innovation. Since previous studies of eXtension revealed a number of respondents remained at the no knowledge stage of the innovation diffusion process, this study included the no knowledge stage as well. The study will also focus on the persuasion portion of the innovation-decision process to examine the perceived characteristics of the eXtension innovation—relative advantage, compatibility, complexity, trialability and observability as shown in Figure 1.

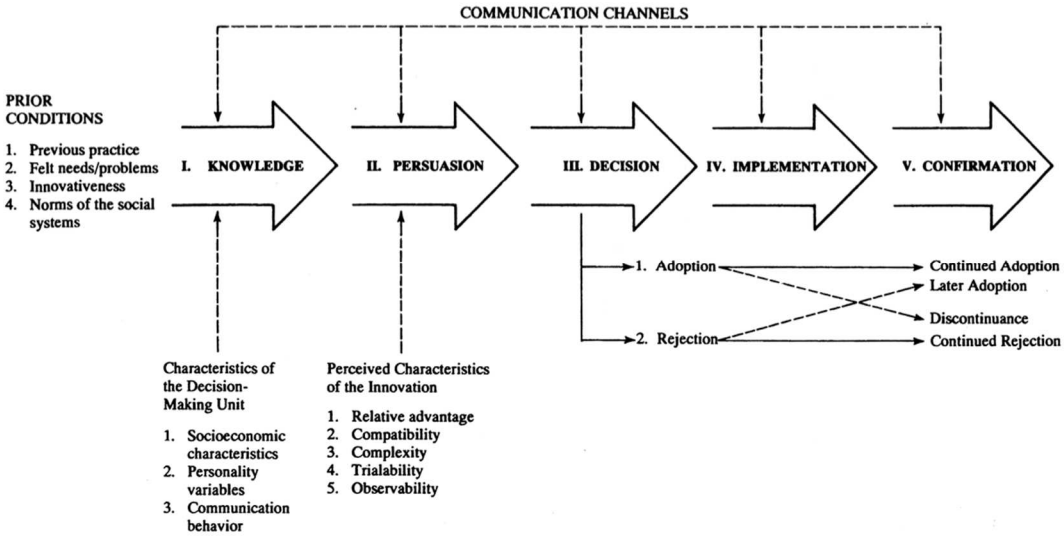

Figure 1. "A Model of Five Stages of the Innovation-Decision Process," by Everett M. Rogers, 2003, *The Diffusion of Innovations*, p.170. Copyright 1995, 2003 by Everett Rogers. Copyright 1962, 1971, 1983 by The Free Press, a Division of Simon & Schuster, Inc. Reprinted with Permission.

In addition, the study used the disruptive innovation theory developed by Clayton Christensen (1997) to assess whether eXtension was perceived to provide new value to Iowa Extension professionals through affordability, accessibility, capacity, responsiveness, simplicity, or customization of a process or product (Christensen, Anthony, & Roth, 2004; Christensen, 1997; Franz & Cox, 2012). The disruptive innovation theory will be discussed more in-depth later in the theoretical framework.

Diffusion of innovations

The Diffusion of Innovations theory focuses on a new idea, practice or object perceived by an individual or group. The characteristics of an innovation—both positive and negative, as perceived by members of a social system, will ultimately determine its rate of adoption (Rogers, 2003).

Iowa native Everett M. Rogers first introduced the Diffusion of Innovations theory to Extension in a two-part article in the Journal of Cooperative Extension (now known as the Journal of Extension) in 1963. In the articles, Rogers reviewed research findings on the diffusion of innovations and its relevance to the acceptance and use of innovations in Cooperative Extension (Rogers, 1963). Fifty years since the article debuted in the Journal of Extension, the presented theories and information relating to the diffusion of innovations and technology adoption process continue to be relevant and utilized in today's Cooperative Extension system.

Rogers stated that, "all Extension workers are change agents—professional persons who attempt to influence adoption decisions in a direction they feel is desirable" (p. 17, 1963). He identified four main areas that were shown to have a key influence on Extension professionals decision to adopt or reject a technology, these include: (1) the adoption process, (2) the rate of adoption of innovations, (3) adopter categories, and (4) opinion leadership. This particular study focused on two of Rogers's identified influences: the adoption process and rate of adoption of eXtension. These areas were further assessed in an effort to better understand Iowa State University Extension and Outreach professionals' perceptions and current rate of adoption of the eXtension.

The main elements in the diffusion of new ideas and technology are: an (1) *innovation* that is (2) *communicated* through certain (3) channels over *time* among the members of a (4) *social system* (Rogers, 2003). An innovation's *communication* channel is the means by which messages get from one individual to another. Rogers (2003) indicated that while mass media channels are an effective communication medium in generating greater knowledge of innovations, interpersonal channels are even more successful in

influencing attitudes in favor or against a new idea or technology. He adds that an individual is most likely to evaluate an innovation based on its adoption by peers, rather than scientific evaluation. Cooperative Extension professionals are the primary potential adopters of innovations (both process and product) in the organization (Dromgoole & Boleman, 2006). The work of Extension professionals in bringing knowledge and information to clientele is an example of the important role interpersonal communications plays in influencing potential adopters' decisions to adopt or reject an innovation.

Time is another important element in the diffusion of a new product or process through the innovation-decision process (Rogers, 2003). The innovation-decision process consists of stages through which an individual passes from initial knowledge of an innovation to forming perception; making a decision to adopt or reject; implementation of the new idea, and then final confirmation of the individual's decision (Rogers, 2003). The innovation-decision process consists of five steps: knowledge, persuasion, decision, implementation, and confirmation. As mentioned earlier, this study will also include a sixth no knowledge stage (Li, 2004). Previous research has shown that more than half (52%, n=237) of Texas Cooperative Extension County Agents' remained at the knowledge stage in their understanding of eXtension in the innovation-decision process (Harder, 2007).

The final element in the diffusion of new ideas is the social system. Members of a social system can be classified into five adopter categories, these include: innovators, early adopters, early majority, late majority and laggards. Early adopters play a significant role in influencing the late majority and laggards' decision to adopt or reject an innovation. The rate of adoption can be defined as the speed by which an innovation will be adopted by members of a social system (Rogers, 2003). In an examination of social influences, Owen (1999)

noted that the structure of a social system can support or obstruct an individual or group's adoption of an innovation. A social system is a complex group of individuals or set of interrelated units that are working together to accomplish a common goal (Rogers, 2003). Providing social systems with regular communication, support and evaluation throughout the introduction and innovation-decision process may aid in influencing the adoption behavior of individuals in a social system, including when the adoption of an innovation occurs.

The Diffusion of Innovations theory has served as the foundation for Cooperative Extension's technology adoption and diffusion efforts (Stephenson, 2003). The concept of the innovation-decision process was initially reported in a study of the diffusion and adoption of hybrid seed corn in Iowa. In the mid-1930s, hybrid seed corn developers and researchers were concerned about the slow rate of adoption of hybrid seed corn that had been disseminated to farmers by the Iowa State Agricultural Experiment Station the decade prior (Rogers, 2003).

The innovation had many advantages compared to the traditional seed corn (Stephenson, 2003), such as the hybrid seed's overall strength and resistance to drought and disease. The diffusion of the hybrid seed was heavily promoted by the Iowa Agricultural Extension Service and by salesmen of seed corn companies. However, despite significant promotion and perceived advantages to adopting the seed corn, there were some Iowa farmers who were slow to adopt the new innovation (Rogers, 2003).

Bryce Ryan, a rural sociology professor and his research assistant Neal C. Gross, a graduate student at Iowa State University, proposed conducting a study of the diffusion of the hybrid seed corn to determine why some Iowa farmers adopted the hybrid seed corn, while others did not (Ruttan, 1996). The Iowa State University researchers studied the adoption and

diffusion of hybrid seed corn and observed that the farmers progressed through a series of decisions and actions before deciding whether or not to adopt the innovation. In 1941, Gross interviewed farmers in Jefferson and Grand Junction, Iowa about when they decided to adopt the hybrid corn. The researchers also assessed the communication channels used at each stage in the innovation-decision process as well as how many of the farmer's corn acres was planted with hybrid versus regular seed corn each year. Respondents were also asked to provide demographic information, including education, age, farm size, income, frequency of travel to large cities, and readership of farm magazines (Ryan & Gross, 1943).

The hybrid seed corn study found that after the first five years since the initial dissemination of the seed corn in 1928, only 10% of the Iowa farmers had adopted the hybrid seed. In the three years that followed, the adoption curve increased to 40% adoption and then leveled off as fewer farmers remained to adopt the innovation (Ryan and Gross, 1943).

One of the most important findings in this study was that the adoption of an innovation is dependent on a combination of interpersonal ties and exposure to mass communication, as indicated by Rogers (2003). The seed salesmen and Iowa Agricultural Extension Service as the initial source for information of the innovation, while interpersonal networks such as local neighbors and farmers functioned as the main influence over the farmers' decisions to adopt. When farmers were able to observe and communicate with other local farmers who had adopted the hybrid corn, they soon learned the benefits of the innovation and chose to adopt the new hybrid seed corn as well (Stephenson, 2003).

The Iowa farmers progressed through a series of five stages that Rogers (2003) defines as the innovation-decision process: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. He affirms that early adopters are more likely to

positively confirm their decision to implement the innovation than later adopters. Therefore, understanding the distribution of early and late adopters throughout the stages of the innovation-decision process offers some predictive value for measuring the level of an individual or group's likeliness to adopt or reject an innovation.

As an individual progresses through the stages of the innovation-decision process, Rogers's theory indicates that there are five characteristics that influence how rapidly an innovation is diffused into a social system, these include: (1) relative advantage, (2) compatibility, (3) complexity, (4) observability, and (5) trialability. Innovations that are perceived by individuals as having greater relative advantage, compatibility, trialability, and observability and less complexity will be adopted more rapidly than other innovations.

The first of the five perceived attributes is relative advantage, which is the "degree to which an innovation is perceived as better than the idea it supersedes" (Rogers, 2003, p. 229). A perceived relative advantage of an innovation can be measured in terms of ease of use, convenience, and satisfaction (Venkatesh et al., 2003). The relative advantage of an innovation is positively associated with a group or individuals increased adoption of an innovation. Rogers (2003) indicates that the first two perceived Diffusion of Innovation attributes—relative advantage and compatibility—are most important in influencing an individual's perception of an innovation and ultimately its rate of adoption.

Compatibility is the degree to which an innovation is perceived as "consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003. p. 240). An innovation that is perceived as incompatible with the existing culture of a particular social system will have a much more difficult time becoming adopted and likely experience slower rate of adoption than if it was viewed to be compatible with the social system. In Cooperative

Extension there exist a longstanding tradition of cultural values and norms that have continually been integrated into the organization since its inception a century ago. Hence, if eXtension is not perceived to be compatible with Iowa State University Extension and Outreach's existing culture, it is likely that the innovation will not be adopted by members of its social system. When an innovation is perceived to have a high level of compatibility by members of a social system, the innovation is more likely to have an increased rate of adoption (Rogers, 2003).

Another perceived attribute of the Diffusion of Innovations theory is complexity, which is "the degree to which an innovation is perceived as relatively difficult to understand and to use" (Rogers, 2003. p.257). Some innovations are easily understood by the majority of the members in a social system; yet, other innovations are perceived to be more complicated and as a result tend to be adopted more slowly. New ideas that are easier to understand tend to be adopted faster than innovations that require the adopter to develop and/or use new skills and understandings (Rogers, 2003). Rogers indicates that of the five Diffusion of Innovations' theory attributes, complexity is the only one that has a negative effect on the rate of adoption. When an innovation is perceived to be too complex to use, members of a social system are more likely to reject the innovation, than to adopt.

Trialability is 'the degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003. p. 258). Rogers's theory indicates that innovations that can be experimented with by users on a trial basis stand a much greater chance of being adopted than innovations that cannot initially be tested by potential adopters. Ryan and Gross (1943) found that by providing Iowa farmers with the innovation, in this case hybrid seed corn, respondents were willing to try the innovation on a limited basis. If the experimental seed

could not have been tested on a trial basis, its rate of adoption would have been much slower. When an innovation is perceived to have a high level of trialability by members of a social system, the innovation is more likely to have an increased rate of adoption (Rogers, 2003).

The final attribute of Rogers's (2003) Diffusion of Innovations theory is observability—"the degree to which the results of an innovation are visible to others" (Rogers, 2003. p.258). The decision to adopt an innovation is greatly influenced by an individual's ability to observe others who have already adopted the innovation. The observability of an innovation is much more likely to influence individuals at the early or late majority adopter categories because these individuals have the benefit of observing innovators and early adopters using the innovation. When an innovation is perceived to have a high level of observability by members of a social system, the innovation is more likely to have an increased rate of adoption (Rogers, 2003).

In summary, the more advantageous, compatible, easy to use, testable, and observable the individual perceives the innovation to be, the higher the potential for the adoption of an innovation. Rogers's Diffusion of Innovations theory has remained instrumental to Extension professionals, scholars, and students and continues to be useful in other fields, including medicine, telecommunications, information technology and social marketing for understanding user adoption and use of an innovation (Hubbard & Sandman, 2007).

Roger's (2003) diffusion of innovations theory recognizes that other variables such as the types of communication channels diffusing the innovation at various stages in the innovation-decision process, the nature of the social system in which the innovation is diffusing as well as the extent of change agents' promotion efforts in diffusing the innovation will all influence an innovation's rate of adoption as well.

Disruptive innovation

The eXtension technology has not been adopted and utilized among Cooperative Extension faculty, staff and clientele as the founders intended it would when the online resource was officially launched in 2008 (Kelsey, Stafne, & Greer, 2011). Therefore, the disruptive innovation theory was also included as part of the theoretical framework to examine whether eXtension was perceived to provide new value to Iowa State University Extension and Outreach professionals through the attributes of affordability, accessibility, capacity, responsiveness, simplicity, or customization of eXtension (Franz & Cox, 2012; Christensen, Anthony, & Roth, 2004; Christensen, 1997).

The theory of disruptive innovation was first introduced by Clayton Christensen (1997) in a study that explored the failure of large, successful companies in being able to recognize and adopt emerging disruptive innovation. Christensen (1997) defined disruptive innovation as an innovation that creates a new market and value network, and eventually disrupts an existing market and value network, displacing an earlier technology.

Disruptive innovation is a process that a technology undergoes when it has previously served only a limited few and is then transformed into one in which its products and services provide new value through the attributes of affordability, accessibility, capacity, responsiveness, simplicity, or customization of a process or product (Christensen, Anthony, & Roth, 2004; Christensen, 1997; Franz & Cox, 2012). Positive perceptions of the six of the attributes are associated with providing new value of a technology and can result in an innovation becoming disruptive within a market existing or new market.

A disruptive innovation is one that redefines the quality of the product or process by gradually improving its performance so that it takes more and more market share over time

as it becomes capable of tackling more complicated problems and serving consumers in the market (Christensen et al., 2011). In every market there is a rate of a technology's performance that consumers can utilize or absorb. As shown in Figure 2, this rate of performance is represented by the dotted arrow sloping upward. Although performance is represented by a single, dotted line, the reality is that there is a range in consumers' ability to utilize or absorb a technology's rate of improvement, represented by the distribution curve at the right in this figure. This indicates that there exists a range in consumer performance preferences of a disruptive innovation—some consumers may never be satisfied with the performance of an innovation while others with lower expectations may be more than satisfied with how the innovation is able to perform (Christensen et al., 2011).

A disruptive innovation initially offers a lower performance that customers can utilize and according to what the market can bear. Overtime, the pace of the technology progresses and the disruptive innovation provides new performance attributes, which allows the innovation to prosper in different markets and among different consumers. As the disruptive innovation improves along traditional performance parameters, it will eventually displace the former, sustaining innovations (as shown in the arrow connecting sustaining and disruptive innovation). Sustainable innovations are instead targeting high-end consumers from existing markets, while disruptive innovation focus on consumers as well as non-consumers in new and low-end markets.

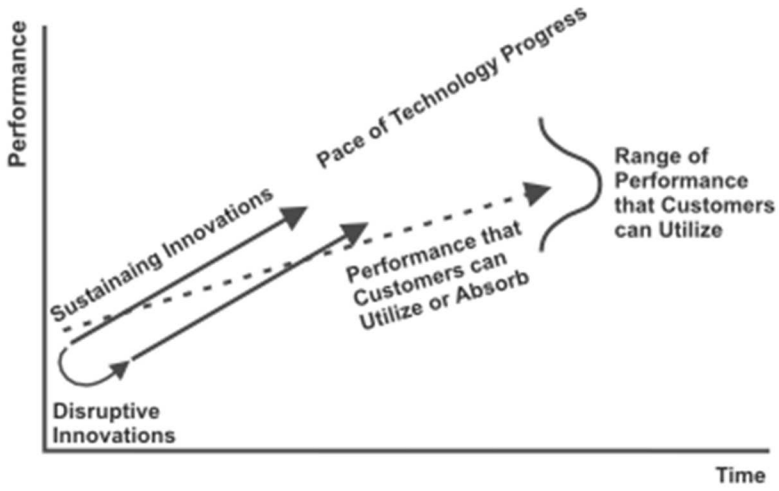

Figure 2. "Disruptive Innovation Model," by Clayton M. Christensen & Michael E. Raynor. 2003, *The Innovator's Solution: Creating and Sustaining Successful Growth* (Christensen & Raynor, 2003), p. 33. Copyright 2003 by Harvard Business School Press. Reprinted with Permission.

Christensen (2008) indicates that there exist two types of disruptive innovation—new-market and low-end disruptions. New-market disruptions succeed because they market their product or process to non-consumers (Christensen, 1997). Personal computers are an example of a new-market disruptive innovation that attract new consumers who had not previously owned or used other forms of that innovation's particular products or services. This type of disruptive innovation creates a new market by targeting previous, non-consumers of an innovation.

eXtension is creating new market disruptions by reaching what Christensen (1997) calls non-consumers—those not currently using or being served by Cooperative Extension. eXtension recently reported that of the people who connect to the eXtension-based *Ask an Expert* system nationwide, 57% are new to Extension (King & Boehlje, 2013). This engagement with non-consumers continues to provide a foundation for growth with new audiences through eXtension.

The second type of disruptive innovation is a low-end disruption, which targets consumers at the low-end of the market by seeking the least-profitable and most over served customers. Large retail stores such as Wal-Mart serve as an example of a low-end disruption in the retail sector as it provides less service and lower-quality items to consumers at a much cheaper price. As Christensen (2008) identified, what causes the low-end disruption is by targeting consumers at the high-end of the market (such as in this example, high-end department stores) by providing a more frequent turnover of inventory than high-end competitors, which has less turnover in product and a small selection of items. Consumers who once felt they needed to shop at department stores to be assured of quality and selection of items now enjoy the same satisfaction provided at large retail stores such as Wal-Mart—a true disruption to the retail market (Christensen et al., 2003; Wal-Mart, 2014).

Nevertheless, some disruptive innovations can also be classified as hybrids—a combination of new-market and low-end disruptions (Christensen, 2008). One example of a hybrid disruptive innovation is Southwest Airlines, which initially targeted customers who weren't flying and instead using other modes of transportation (new-market) and providing flights at a much lower-price (low-end) than their more expensive airline competitors. Southwest Airlines is a successful disruptive innovation that is reaching targeted markets by working to "connect people to what's important in their lives through friendly, reliable, and low-cost air travel" (Gallo, 2014).

Understanding how to identify and adopt disruptive innovations facing organizations before the technology becomes main stream is a challenge. Disruptive innovations are more difficult to identify because they are complex and often emerge rapidly in new or low-end markets (Gordon, 2006). By the time large, complex organizations such as Cooperative

Extension become aware of new disruptive technologies they are oftentimes slow to adopt and adapt their current practices to implement the technology. Those who did not invest in the disruptive technology are soon left behind. This, according to Christensen (1997), is termed the "Innovator's Dilemma".

A Disruptive Innovation's perceived affordability, accessibility, capacity, responsiveness, simplicity, or customization of a process or product (Christensen, 1997; Franz & Cox, 2012; Christensen, Anthony, & Roth, 2004) are key variables which, when present in an innovation, have been found to disrupt new and low-end markets to become a disruptive innovation. If successful, a disruptive innovation then becomes a sustaining innovation that can directly contribute to organizational sustainability (Christensen et al., 2008).

With today's influx of information and new technologies, disruptive innovation is needed to survive dynamic and complex global markets, uncertain economic situations, increase competitive advantage, and prevent organizational decline (Christensen et al., 2008). This study examined whether the eXtension technology contained the qualities needed to create new value for Iowa State University Extension and Outreach and become a disruptive innovation for the organization and its clientele.

Disruptive innovation in higher education

Christensen's (1997) disruptive innovation theory has relevant application in the business sector as well as in higher education. Yet, understanding how to identify and adopt disruptive innovations facing organizations before the technology becomes mainstream is a challenge in both business and higher education environments. Disruptive innovations are

more difficult to identify because they are complex and often emerge rapidly in new or low-end markets (Gordon, 2006). By the time large, complex organizations in business and education systems become aware of new disruptive technologies they are oftentimes slow to adopt and adapt their current practices to implement the technology.

There are many reasons why successful and seemingly invincible business and educational systems with strong management practices can experience failure when faced with a disruptive technological change. Oftentimes, failure occurs because organizations are not structured to embrace new ideas, recognize market trends, adapt quickly to new innovations or develop disruptive innovations. Internal and external barriers in business and education are most often the cause for inhibiting disruptive innovation from being adopted or even developed. Assink (2006) identifies nine barriers to disruptive innovation in business that are also prevalent in higher education environments.

Many organizations limit the capabilities of their industry to focusing time, money and efforts on improving existing technologies and ideas, which are known to be successful. This inhibitor is considered an 1.) adoption barrier because firms run the risk of being surpassed by companies that are innovative and developing disruptive innovations that could potentially disrupt the entire market. In addition, the hierarchical structure of many large companies and institutions of higher education are not structurally designed to embrace disruptive innovation development within their organizations. 2.) Organizational dualism is a barrier in many large organizations that struggle to maintain current successful business and education practices but in the process leave limited room for the incorporation of innovation that can move their organization forward (Assink, 2006).

Additionally, 3.) excessive bureaucracy is often identified in large organizations that adhere to strict rules and processes which can minimize the opportunity for creativity, delay reaction to new information and ideas and create a risk-averse culture. If disruption is to occur in higher education at public universities, it will likely happen at the state level leadership and not at each of the individual institutions. If private universities are able to navigate this disruptive transition, Christensen et al. (2011) believe that they will have to do so by creating autonomous business units.

Assink (2006) also believes that large organizations are designed to preserve the 4.) status quo. Innovation and deviations from the norm can be perceived as negative among many business and higher education environments. A 5.) lack of distinctive competencies among the organization and its employees can also hinder the ability to change and the adoption of future innovations. Yet, being able to change current understanding and procedures in order to embrace new market changes is most often not a core competency of global organizations (Gordon, 2006).

The pre-determined ideas and beliefs of an organization can also be a 6.) mindset barrier to identifying, embracing and developing disruptive innovations and innovative thinking. A key mind barrier to future organizational development is the continued use of 7.) obsolete mental models and theory-in-use. Individual and organization-wide beliefs that are no longer relevant, effective and fail to meet the needs of the changing business or education environment are considered an inhibitor to organizational growth (Assink, 2006).

Finally, 8.) risk barriers will continue to occur when educational organizations maintain an "inward-focus" and fall into the rote trap of doing and producing the same product even in situations where it is no longer effective. Due to the size of many institutions

of higher education and businesses, there exist a 9.) nascent barrier, or inability to motivate and nurture new and creative ideas from its employees. The standard rote procedures of business as well as the teaching and learning processes in higher education can stunt the creative ability and growth within these organizations (Assink, 2006).

Significant barriers to adopting and developing disruptive innovation exist in business and higher education environments. As both strive to advance in product and performance quality, many large, complex entities are losing touch with the true needs of mainstream clientele. On the contrary, higher education is to continuing to develop and provide students with tailored learning and learning environments that are resulting in increased student enrollment, the hiring of new faculty and enhanced learning opportunities for students (Schuman, 2014).

Online learning is progressively becoming a disruptive innovation within higher education as it reaches students through new and low-end markets. This disruptive innovation is changing how education is delivered and received, particularly to non-consumers—people who were not able to be served or were not desirable to serve in traditional higher education markets (Christensen, 1997). Online learning is disrupting higher education by providing educational opportunities that are more affordable, are accessible to students, are easy to use, are responsive to student needs, and have the capacity for continued growth. In addition, online education is providing customized learning experiences using a variety of technologies and teaching methods that tailors learning for the learner (Christensen, 2008).

Online learning is the cause for growth in the for-profit higher educational sector as well. Approximately 25% of students in the U.S. were enrolled in at least one online course

in 2008. The following year, 30% of students were taking online courses. It's projected that 50% of college students will enroll in an online course in 2014 (Christensen et al., 2011). As more students continue to enroll in online learning opportunities, public and private institutions will need to stay abreast of emerging technologies in online education. In addition, the work of community colleges and for-profit institutions must also be on the radar of four-year colleges and institutions as they are also disrupting higher education by providing even more cost-effective and performance effective ways to teach and learn core competencies than traditional colleges and universities (Christensen, 2008).

Businesses and education entities are regularly faced with innovation uncertainty. There is no way of being able to predict what these organizations need to know and how to prepare for the emergence of new technologies in their marketplace. Disruptive innovations thrive in organizational environments that are small as well as receptive to uncertainty and new ideas (Assink, 2006). Organizations with successful disruptive innovations have (1) a clear business agenda, (2) strong partners committed to change, (3) investment by both parties rooted in the user community, (4) links to other organizations, and (5) commitment to sustain and replicate results (Franz & Cox, 2012). Business and higher educational environments will need to focus more time, money and efforts on advancing both sustaining technologies as well disruptive technologies in order to remain competitive in the marketplace.

History of Extension in Iowa

"Novel in form, noble in purpose, the land-grant system has from the start had no equal," (Albright, 2000, p. 15). The vision of utilizing the land grant university's mission and

extending it to the people through the Cooperative Extension system has deep roots in American history. Today we celebrate more than 150 years of public higher education made possible with passage of the Morrill Act, signed into law by President Abraham Lincoln on July 2, 1862. The bill established land-grant institutions throughout the U.S. and espoused the beliefs that higher education should be accessible to all, particularly in practical subjects, such as agriculture, mechanical arts and military tactics (Library of Congress, 2014).

To advance the development of land grant institutions, each state was given an incentive of 30,000 acres of public lands per the number of senators and representatives each state held in Congress. The bill tended to be more favorable to the populous eastern states (Becker, 1943). However, the Morrill Act made it possible for the new western states to establish colleges for their citizens and forever advance the accessibility to higher education in America.

These federal resources and support provided the springboard for establishing public colleges and universities nationwide (West et al., 2009). The Iowa legislature was the first to accept the provisions of the 1862 Morrill Act, which was awarded to the Iowa Agricultural College (now Iowa State University of Science and Technology) in 1864. At that time, the Iowa Agricultural College became the first institution in the nation to be a part of the new land-grant experiment of providing higher education in not only liberal studies, but also practical subjects for all citizens (Zanish-Belcher, 2006).

Congress provided additional federal funding to land-grant institutions through the enactment of the Hatch Act in 1887. The Act provided federal grant funds to establish an agricultural experiment station in connection with each state land-grant institution to further agriculture-based research and education. The Morrill Act of 1890 then followed to establish

black land-grant institutions in eighteen states (Association of Public and Land Grant Universities, 2008). The establishment of 1862 and 1890 land-grant institutions, in addition to the research experiment stations developed through the Hatch Act of 1887 laid the groundwork for public education and research that was needed, particularly to propel agricultural production into the 20th century.

Research-based agricultural information served as a vital resource to Iowa farmers' crop and livestock production. Yet, during the early 1900s a challenge existed in getting agricultural resources and information from the Iowa State College to farmers throughout the state (Iowa State University, 1956). Farmers expressed a need for relevant, research-based information from the university to advance their agricultural production practices. "We do not want science floating in the skies; we want to bring it down and hitch it to our plows" (Strausberg, 1989, p. 9).

Iowa State University professors often shared research and information with farmers by way of educational events on campus and throughout rural parts of the state. In 1903, agronomy professor Perry G. Holden traveled the state to educate farmers about effective seed corn production practices. His popular demand soon led him to present at the Sioux County Farmers Institute in Hull, Iowa where the northwest Iowa farmers began to question whether Holden's crop experiments conducted at the state college about 200 miles away would apply equally well in Sioux County (Findlay et al., 2003).

Holden advised the corn growers, with the support of Iowa State University, to use local expertise to conduct regular crop demonstrations; consult with farmers about their production problems, and work with local youth to assist in spreading knowledge from the university to the people (Findlay et al., 2003). The new Sioux County Extension program set

out to improve farmers' seed corn through research, teaching and outreach, which started an educational movement that dispersed throughout Iowa and the Corn Belt region. Demand for local agricultural education soon led to the development of demonstration plots and the Seed Corn Gospel Train (Eddy, 1957).

In 1904-1905, Professor Holden's corn gospel trains equipped with corn specimens, charts and demonstration materials traveled the state, reaching an estimated 127,000 Iowans. Farmers in attendance could hear lectures, secure publications and walk through the train to study corn exhibits (Seevers & Graham, 2012). A significant number of farmers had to sign a petition in order for a gospel train to stop at any town station. There were very few Iowa towns which, when given the opportunity, did not get enough local farmers to sign a corn train petition. Education by way of train was the first effort made to effectively reach masses of farmers with information on seed corn improvement nationwide and ultimately increased the yield of Iowa corn production by millions of bushels (Bliss, 1960).

The work of the Corn Gospel Train ultimately led to the passing of legislative support to provide agricultural and home economics information to all people through the signing of the Iowa Agricultural Extension Act of 1906 (Bliss, 1960). This act was the first legislation in the U.S. to provide state appropriations to support the development of agricultural extension educational service. By 1914, farm cooperative demonstration work was occurring in fifteen states across the nation (Seevers & Graham, 2012).

As a result of rapidly growing state Extension work across the U.S., the Smith-Lever Act was signed into law in 1914, establishing the national Cooperative Extension Service and its partnership with the U.S. Department of Agriculture and the state land-grant institutions of 1862 and 1890.

> Its purpose was to inaugurate, in connection with these colleges agriculture extension work…in order to aid in diffusion among the people of the United States useful and practical information on subjects relating to agriculture and home economics, and to encourage the application of the same (Eddy, 1957, p. 140).

The Act allocated federal funding (to be matched by states involved) to establish Cooperative Extension and the dissemination of research-based information from the state land-grant institution through a network of state, regional and county Extension staff and offices to the citizens of its state. The Smith-Lever Act provided instruction and practical demonstrations of practices and technologies to enhance agriculture, (U.S. Department of Agriculture, 2009), which eventually also included mechanical and home economics fields.

"Helping farmers farm better" was a slogan used in the beginning years to explain Cooperative Extension's mission of disseminating information on the most relevant agricultural and mechanical practices to farmers and ranchers (West et al., 2009). Today, it's evident that the success of the U.S. agricultural industry is directly linked to the research practices and outreach to farmers that has been delivered by Cooperative Extension for the past 100 years. Indeed, few federal acts have been signed into laws that have had the same lasting impact on U.S. citizens since the federal establishment of Cooperative Extension services (Seevers & Graham, 2012).

The Scholarship of Extension

Extension has a long-standing reputation for delivering high-quality, research-based, unbiased information and education. The work of Extension is also steeped in scholarship as the organization strives to deliver on the Smith-Lever Act's intent "…to encourage the

application of the same" (Eddy, 1957, p. 140). Over the last century, the organization continues to advance scholarship of Extension by linking theory with practice to advance and broaden the application of research-based information to engage the citizens of its state.

Boyer (1990) defined scholarship as four equal scholarly components, which include scholarship of discovery: investigating new human knowledge and contributing to the field of research; the scholarship of integration: making more interdisciplinary connections and viewing discovery in a larger context; the scholarship of teaching: transmitting and transforming knowledge; and finally, the scholarship of engagement: linking theory and practice to apply knowledge in a broader context. When theory and practice come together, the process of engagement becomes scholarly and can lead to a collaborative working relationship with clientele that produces effective and useful scholarly products (Wood, 2013).

Extension has been delivering on the scholarship of engagement since the organization formally began a century ago by providing hands-on application of scholarly research and learning. As Extension continues to advance and evolve, the organization has remained true to its founding mission of providing engaging scholarship to the citizens of its state (Bull et al., 2004). This is evident in the 1990 version of the Smith-Lever Act, in which section two emphasizes application, research and instruction within Extension:

> Cooperative agricultural extension work shall consist of the development of practical applications of research knowledge and giving of instruction and practical demonstrations of existing or improved practices of technologies in agriculture, home economics, and rural energy, and subjects relating thereto… (Long & Bushaw, 1996)

The 1990 version of the Smith-Lever Act reaffirms Cooperative Extension's dedication to scholarly work that aligns with the land-grant institutions' mission of teaching,

discovery and engagement. As Extension continues to broaden the scope of its work and outreach to those not currently served by the organization, Boyer's (1990) scholarship of integration will also expand by educating outside entities, non-consumers, and non-specialists.

The use of online technologies has changed how scholarship is conducted within Cooperative Extension as well. "Digital scholarship"—delivering scholarly information via online technologies is becoming the norm for conducting engagement, teaching and research within Extension (Stafne, 2013). In today's digital age, consumers are looking to the internet to access information quickly and conveniently. Yet, most often consumers are seeking information that is accessible, not necessarily the information that is most accurate. Cooperative Extension's presence in the realm of digital scholarship is critical to providing online users with credible, research-based information. In addition, the online scholarship of Extension needs to be presented in a way that is interactive, user-friendly and engaging in order to be seen as a leader and competitor in providing accessible information in the digital marketplace.

"Extension's mission is to take the university to the people. To do so, we should go to where the people are" (Seger, 2011). According to the Pew Research Internet and America Life Project, 87% of all American adults now use the Internet and 68% of those adults are actively searching for information from a variety of sources, including social media sites such as Facebook, Myspace and LinkedIn. Today, 65% of the general public believes that new Internet technologies are making our lives more efficient and effective. Nearly half of all American adults (47%) get at least some news and information on their phone or computer and the information they seek is available to them in real time. Over the last five years,

consumers' time spent online has grown 121% (eXtension, 2014). And these metrics are on the rise.

The relative advantage of adopting web-based learning systems, such as eXtension, are numerous (Mitchell & Gillis, 2006). Yet, studies show many perceived disadvantages or barriers in using asynchronous online learning continue to exist. Research has found problems identified with web-based education to include technical difficulties; a sense of learner isolation; learner frustration, anxiety, and confusion; higher learner attrition rates as well as the need for greater discipline, writing skills and self-motivation; and the need for online users to make a conscious time commitment to learning (McCann, 2007; Sitzmann, et al., 2010; Smart & Cappel, 2006).

Finding the proper balance between developing a technology-focused organization while continuing to support traditional forms of educational outreach will be important as the organization continues to make educational services readily available to a range of audiences. However, these technological changes have forced the organization to redirect resources and create a staff of Extension specialists that are adept at delivering programming using new delivery methodologies. eXtension, is just one example of the technologies that have been developed to increase the public's access to objective, science-based information through Cooperative Extension.

The History of eXtension

Since Cooperative Extension's early years providing farmers with cutting-edge research methods on hybrid seed corn, the organization has built a reputation for distributing relevant, practical information, and resources to address the evolving needs of people,

families and businesses in local communities (Sobrero & Craycraft, 2008). The influx of new Internet technologies in recent decades have provided Extension with an even greater mode for delivering advanced research, technologies, and ideas to citizens across the U.S. In fact, many state Extension systems have been engaged in using and providing online learning since the mid-1990s (Jackson et al., 2004).

The technology used within Cooperative Extension began to significantly change at the turn of the 21st century when the Internet and other learning innovations challenged Cooperative Extension to rethink its traditional educational outreach methods (Seevers & Graham, 2012). As a result, several online educational resources, such as eXtension – *America's Research-based Learning Network*™, were developed for Extension professionals and clientele. eXtension is the result of Extension and Outreach recognizing that how consumers obtain information and resources can no longer be limited to traditional forms of communication and outreach.

The vision for the online eXtension initiative was first developed in 2001 by an Extension Committee on Organization and Policy in collaboration with Accenture, a global management consulting, technology service and outsourcing company, to create a platform for Extension to use the availability of the Internet to organize, manage, and deliver online Extension information and education. In regards to conducting a needs assessment of eXtension, there were multiple opportunities to gather information and provide input. In addition, "state Extension organizations were asked a series of questions relative to the current state of technology in their respective systems and about their (technological) needs" (D. Cotton, personal communication, December 18, 2014).

The Cooperative State Research, Extension and Education Service (CSREES) and many of the 1862 and 1890 land-grant institutions provided much of the initial four million dollar budget for eXtension (Harder, 2007). Today, eXtension is now supported by the eXtension Foundation, a 501(c)(3) organization that continues to actively reach out to new public and private funding partners. In addition, each state Extension system is required to pay an annual assessment to support the growth and development of the technology (C. Kress, personal communication, November 24, 2014).

eXtension is administered by a board of directors whose membership is comprised of directors and administrators of Cooperative Extension in addition to key stakeholders (eXtension Foundation, 2014). A network of Extension professionals from across the U.S. then also serves to answer questions and concerns in eXtension through various educational formats, including "frequently asked questions, brief fact sheets, Ask the Experts, chat sessions and discussion groups, decision support tools, web conferencing, streaming video, distance diagnostics and educational modules" (About eXtension, 2014).

eXtension provides research-based information for groups that are defined as, Communities of Interest, which consist of an association of clientele who share similar questions, interests, and educational needs about a particular topic such as food safety, youth development, water quality, consumer management, families and health. Engaging Communities of Interest is the responsibility and ultimate goal of the Communities of Practice, which consists of subject-matter experts (i.e., state and county Extension agents, faculty, and staff) from land-grant institutions across the country who work together to create online educational programs and interact with people who are seeking solutions to problems and answers to questions (About eXtension, 2014). The contribution of specialists and

knowledge-providers is crucial to maintaining that each of the Communities of Practice contain accurate and relevant information for Extension professionals and clientele alike.

Cooperative Extension recognizes and works to serve all clientele, including tech-savvy consumers – as they increasingly demand instant access to a variety of technologies, including eXtension information that is accessible via computers, tablets, and smartphones. eXtension provides relevant research-based information on current issues and a broad array of topics offered to users in the form of credible research articles, news, events, webinars and user interaction via social media. Users also have access to a frequently-asked-questions database, which provides consumers the opportunity to submit questions and receive answers from content experts located across the country, including Extension agents, staff and faculty members (eXtension, 2014).

In order for Extension to be seen as a competitor and valued source for information in a technologically dependent world, the organization must continue to embrace innovative and efficient methods of educational outreach. Cooperative Extension could have the best research and information in the world, but if we don't put the message out there in ways audiences now want to find it, we've already lost the battle (Seevers & Graham, 2012).

Reflecting on the last 100 years of Extension work in Iowa, the organization continues to deliver on the intent of the 1914 Smith-Lever legislation by pledging to meet the state's needs for research, knowledge and educational programs that enable individuals, families and communities to make educated decisions that improve well-being. Change is inevitable and will continue to occur as long as the work of Extension is in practice. Even in the midst of change, the investment of the Smith-Lever Act has been reaffirmed because Cooperative Extension continues to adapt its outreach, technology, and scholarship to meet

the varying needs of its citizens. The future success of Cooperative Extension will depend on the organization's ability to adopt innovation, enhance human capital, improve productivity, and broaden the scope of engagement while continuing to carry forth the intent of the Smith-Lever Act of 1914.

Current state of eXtension

Six years since the official launch of eXtension, the online initiative has grown and continues to adapt to meet the needs of Cooperative Extension professionals and their clientele. In eXtension's 2013 annual report, the online resource published more than 17,000 research-based articles to the eXtension website. In addition, nearly 3,200 experts answered 48,000 Ask the Expert questions. In addition, there were more than 21,000 users of Moodle and 1.6 million contacts through eXtension's social media were made, which was a 124% increase from 2012. The eXtension report also shared that since the technology was established, Cooperative Extension has received $1.58 of additional funds from contracts, sponsorships, donations, online course revenue, and grant funding for each one dollar invested by Cooperative Extension directors and administrators in the eXtension technology (eXtension, 2013). Even though the use of the technology and its benefit to Cooperative Extension continues to grow, the rate of adoption of eXtension among Extension professionals has been disappointing (Kelsey, Stafne, and Greer, 2011). In a recent study on eXtension's rate of adoption among Oklahoma Extension employees, 80% of the respondents had heard of eXtension, indicating knowledge of the innovation and the first stage in the adoption process. Yet, more than half of the respondents had never used eXtension in their

work, indicating the innovation had not progressed beyond the knowledge stage; nearly four years since the online eXtension initiative was launched (Xu & Kelsey, 2012).

Founders of eXtension envisioned Extension professionals would adopt the technology at a rate of 75% in the first year (Harder & Lindner, 2008). However, results from a study conducted in 2007 among Texas Cooperative Extension agents found the majority of respondents had very little knowledge of the eXtension or motivation to learn to use the technology. Thirty-one percent of the Texas Extension agents remained at the no knowledge stage (Li, 2004) of eXtension and approximately half of the respondents had knowledge of the online resource but chose not to adopt. Harder's (2007) study was conducted prior to the official launch of eXtension as a result of the first public resources being launched by several Communities of Practice in 2006, including *HorseQuest*, *Financial Security for All*, and *Wildlife Damage Management* (D. Cotton, personal communication, December 18, 2014). At the time of Harder's study, only eight percent of Texas Extension agents who responded to the study had knowledge of the innovation and were using the online resource. In a study of Oklahoma Extension professionals in 2011, a survey found that 49% of respondents were using eXtension in their work (Kelsey, Stafne and Greer, 2011).

The Texas agents also indicated that eXtension was perceived to have a low degree of observability given that the website had not been well publicized and did not appear to be visible among the Texas Extension professionals and their clientele. The technology was also not perceived to save the agents' time in their work nor did respondents feel they had adequate training on how to use and incorporate eXtension into their work (Harder, 2007). And as Kelsey, Stafne, and Greer (2011) found in their assessment, Oklahoma Extension employees perceived the eXtension website to be difficult to navigate. A lack of

administrator support was also reported as well as failure to provide incentives for Oklahoma Extension employees to adopt eXtension, resulting in employees failing to make eXtension a priority in their work.

In studying the adoption patterns of other online technologies among The Ohio State University Extension professionals some were quick to adopt new learning technologies, while others were resistant due to concerns related to technical issues related to Internet connectivity, a lack of adequate technology equipment to receive information at a distance, and a lack of knowledge and skills associated with the technology to provide and promote Extension education online (Seger, 2011). In addition, Extension professionals continue to struggle to find a balance between serving traditional clientele face-to-face while trying to increase their reach to clientele online (Dromgoole & Boleman, 2006).

In other studies of the adoption of online technologies among Extension professionals, respondents indicated that they are interested in receiving education at a distance because of its low cost, convenience and ease of accessibility (Yaghoubi, 2009). However, in order for online learning to be successful among adult audiences, learning must be relevant to its targeted audience and learners must have the appropriate technology and skills to use the technology (Senyurekli et al., 2006). In addition, adult learners must be motivated to use and adopt the innovation. In studying the adoption of eXtension among Texas Cooperative Extension agents (Harder, 2007), respondents did not have the knowledge nor the skills needed to implement eXtension in their work. Thus, Extension agents were unmotivated to adopt the innovation and unlikely to visit or contribute to the eXtension online resource.

Despite barriers to adopting eXtension and other educational technologies, Texas agents reported that the online resource was perceived to be easy to use (Harder, 2007). The Texas agents also believed that adopting eXtension would make their jobs easier and that eXtension was supportive of the mission of Cooperative Extension. In Oklahoma, 43% of respondents were willing to join a Community of Practice, which indicated that the Extension employees saw value in adopting eXtension (Kelsey, Stafne, Greer, 2011). Harder and Linder (2008) predicted that as the eXtension technology becomes increasingly integrated within Extension professionals' daily activities, the perceived compatibility of the technology should also increase.

Harder and Lindner were correct in their predictions made back in 2008. As more content, Communities of Interest, and Communities of Practice have been added to the eXtension resource, data have shown a significant increase in visits to the eXtension website. According to the usage metrics of eXtension in 2012, 36,976 Iowans visited eXtension, an increase from 21,318 (73%) in 2008. The average number of page views per visit remains low, approximately 2.71. According to the Ask an Expert metrics in 2013, Iowa has 196 expert members (who serve in 53 communities of practice) that answered 1,488 questions which were asked by 1,147 users (eXtension, 2014; Lambur, 2012).

Recognizing the needs of current and potential adopters of eXtension is the key to achieving and maintaining further adoption of the innovation. Current and potential users of eXtension require professional development and in-service opportunities to strengthen the positive perceptions and overall adoption of eXtension. A lack of user-training opportunities may also increase the perceived complexity and lack of compatibility of the new technology as a valued resource for Extension. Identifying which resources and training professionals

require in order to successfully adopt, diffuse and contribute to eXtension is needed to further the adoption of eXtension.

Future of eXtension

Since the establishment of eXtension, a great deal of Cooperative Extension's financial, human and time resources have been and continue to be invested in the online resource. The current model for eXtension provides each state Extension system—both large and small—with equal access to resources, information and support. This has some of the larger state Extension systems concerned as to why they should continue to support and serve a national initiative when they can provide equal if not better resources to professionals and clientele within their own states, particularly within larger state Extension systems (C. Kress, personal communication, November 24, 2014). The emphasis to support a national versus local, state-lead initiative in addition to a lack of incentive for larger institutions to engage in eXtension has some state Extension systems questioning the value and sustainability of eXtension (King and Boehlje, 2013).

> *From the start, eXtension never attempted to create a model for rewarding larger institutions for the additional scholarship and resources they bring to eXtension than the smaller state Extension systems* (C. Kress, personal communication, November 24, 2014).

One of the greatest barriers to technology adoption in Extension is not the technology itself, but the culture of the Extension system. As an organization that has been providing traditional face-to-face methods of information diffusion for 100 years, many professionals feel that Extension programs should still emphasize one-on-one personal contact and relationships first (Dromgoole & Boleman, 2006). Some Extension professionals fear that adopting eXtension will keep them from being able to meet the educational demands (i.e.,

face-to-face, print publications, etc.) of traditional clientele. Yet according to Radar (2011), Extension continues to meet the educational demands of traditional Extension audiences instead of directing resources to new audiences.

It's evident that the future success of eXtension lies in Cooperative Extension's ability to maintain a balance between meeting the variety of needs of traditional Extension clientele while working to provide Extension services that are valued and competitive in today's information-driven world (Seger, 2011). In addition, eXtension's perceived ability to become a disruptive innovation for Cooperative Extension is also necessary for the future growth and success of the technology.

The impact of eXtension becoming a disruptive innovation could result in the non-existence of print publications, face to face Cooperative Extension services, and even state Extension system websites no longer serving as a direct access point for the information needs of clientele. The disruption of eXtension would strengthen the focus of a national initiative rather than a local, state lead effort for educational outreach, which may or may not lead to a more relevant and effective Cooperative Extension system. Since the launch of eXtension, other technologies have also been shown to be a greater disruptive innovation to online learning, including TED-Ed, Massive Open Online Courses (MOOCs), YouTube and even prominent information search engines (e.g., Google, Yahoo, Bing, etc.).

Given that the technology has not been adopted as founders intended it would six years since the official launch of eXtension, the online resource will need to reinvent itself by developing a new business model that creates, delivers and showcases the technology's value for state Extension systems, their professionals and clientele alike. King and Boehlje (2013) identified that a new model for eXtension should include a clearly identified (1) value, which

would explain how eXtension addresses the needs of clientele and potential clientele in addition to identifying a (2) strategy for determining how eXtension will increase its perceived value and increase competitiveness in an already populated market for online resources. The business model will also need to include a (3) value map to identify the processes and resources that will be needed and used to carry-out the proposed value-oriented approach to eXtension works as well as a (4) strategy for increasing the profit of eXtension in order to cover the expenses to maintain the resource and to become a sustainable entity.

A plan called “Disruptive E-nnovation” (Meisenbach, 2014, March 10) has been developed by Cooperative Extension leaders and eXtension staff to identify target audiences as well as explore potential internal and external partnerships to enhance the value for eXtension. Disruptive E-nnovation is being implemented to build the capacity and further align eXtension with the needs of Cooperative Extension professionals and their clientele. This initiative will also allow the developers of the eXtension to recognize what users "hire" eXtension to do for them and to better understand users’ expectations of the online resource (Christensen, Horn, and Johnson, 2008).

An eXtension Strategic Planning Committee identified four objectives for advancing the work of eXtension, these include using (1) innovation as the driving force to ensure that Cooperative Extension remains at the forefront of the online learning curve, in addition to continuing to (2) engage current and potential users of Extension by enhancing the content and resources available via the online resource. eXtension will also strive to provide forward thinking (3) leadership that will make eXtension progressive in the fast-paced online environment, while providing (4) entrepreneurial support to new endeavors, private and

public-sector partnerships as well as opportunities for revenue generation (Meisenbach, 2014, June 4).

In October of 2014, the eXtension strategic planning committee proposed the following business model to the ECOP titled, "The New eXtension," which was designed to focus on providing an online resource that offers professional development and innovative opportunities to best meet the needs of the "21st Century Extension professional" (eXtension strategic planning committee, 2014). The offerings of eXtension would be available based on state's membership, instead of the traditional assessment that allowed state Extension systems to participate and use the online resource. In addition, this model would transform eXtension's current public service assessment model to a non-profit model that would be operated by its membership.

These new efforts are taking into account the ongoing technological advancements that are occurring among all types of communication devices as well as consciously working to provide online learning that meets the needs of both digital natives and non-natives (Meisenbach, 2014, June 4). If the ECOP approves the proposal, eXtension will move forward with contacting state Extension directors to inquire if they will become an eXtension member at either the basic or premium membership level and intend to begin the search for a CEO for eXtension in early 2015 (eXtension strategic planning committee, 2014).

Jimmerson (1989) predicted that a paradigm shift in values and beliefs is needed to address the conflicts in science, technology, and the amount of new information available in future years. The intent of the Smith-Lever Act has always been to deliver innovation in the form of products and processes to its clientele. In order to the fulfill the mission of Cooperation Extension, the organization will need to embrace new technologies, modes of

information delivery and new forms of digital learning that will extend the outreach and engagement of Extension's work.

eXtension has the potential to become a much more impactful innovation within Cooperative Extension by continuing to allow new audiences access to eXtension content information and solutions, in addition to being a force in expanding engagement of resources and content expertise in state Extension systems across the U.S. eXtension has the capacity to still become an effective innovation due its characteristics which are needed to create a new market and value network in Cooperative Extension. The future success of Cooperative Extension and the eXtension technology will be determined by its ability to be innovative, progressive, flexible and adaptable to change.

CHAPTER 3. METHODOLOGY

Research Design

The purpose of this study was to investigate the perceptions of eXtension held by Iowa Extension professionals using Rogers's (2003) diffusion of innovations and Christensen's (1997) disruptive innovation theories.

A quantitative descriptive research design was used to capture descriptive and inferential statistics on the adoption and perceptions of the eXtension technology. This research design was be used to analyze perception-based information from Iowa State University Extension and Outreach professionals regarding participants' stage in the adoption of the eXtension technology as well as the perceived relative advantage, compatibility, complexity, trialability, observability, affordability, accessibility, capacity, responsiveness, and customization of eXtension.

Subjects/data source

The target population for this census survey consisted of 975 Iowa State University Extension and Outreach faculty and staff as identified through the Iowa State University Extension and Outreach directory. The entire target population of Iowa Extension professionals was relevant and accessible for participation in this study. A census survey was conducted to minimize sampling error (Dillman et al., 2009)

The purpose of Iowa State University Extension and Outreach is to best serve the citizens of Iowa by providing access to high-quality education; research applied to the needs of Iowa, the nation, and world as well as extending knowledge to strengthen Iowa's economy and citizens' quality of life. Iowa State University Extension and Outreach delivers on its

purpose through four program areas: agriculture and natural resources, community and economic development, human sciences, and 4-H youth development (Iowa State University Extension and Outreach, 2014). The population for this study included Iowa Extension professionals from each of the four educational program areas.

Instrumentation

An online questionnaire was developed and administered to Iowa State University Extension and Outreach professionals to determine their current stage in the innovation-decision process and the perceived characteristics of eXtension (Rogers, 2003) as well as the perceived value of eXtension to become a disruptive innovation (Christensen, 1997). The online questionnaire was designed for this study based on previous technology acceptance survey instruments developed by Wells (2009), Harder & Linder (2007), and Moore & Benbasat (1991). The online questionnaire contained five sections examining (a) stage in the innovation-decision process, (b) perceived diffusion of innovation characteristics of eXtension, (c) perceived disruptive innovation characteristics of eXtension, (d) background characteristics of Iowa Extension professionals, and (e) open-ended questions on eXtension.

The questionnaire was designed to assess each respondent's stage in the innovation-decision process. Participants were asked to select one of the six statements that aligned with Iowa Extension professionals' stage of adoption. The stages were based upon Rogers' (2003) diffusion of innovations theory process: (a) knowledge, (b) persuasion, (c) decision, (d) implementation, and (e) confirmation. A sixth stage, no knowledge, was included based upon Harder's (2007) adaption of Li's (2004) findings that the five stages failed to include

adopters who, upon completing the study, had no knowledge of the innovation. Part 1 of the survey instrument was originally developed by Harder (2007).

Part 2 of the questionnaire assessed Iowa State University Extension and Outreach professionals' perceptions of eXtension. Participants of the study responded to 22 statements using a five-point Likert scale opinion rating (1=*Strongly Disagree,* 2=*Disagree,* 3=*Neither Agree nor Disagree,* 4=*Agree*, 5=*Strongly Agree)*. Rogers's (2003) characteristics of an innovation were used to categorize statements into the following variables: (a) relative advantage, (b) compatibility, (c) observability, (d) trialability, and (e) complexity.

Part 3 measured Iowa Extension professionals' perceived new value of eXtension as identified through the disruptive innovation theory. Participants were asked to once again rate nine Likert scale opinion ratings. Christensen, Anthony, & Roth (2004), Christensen (1997), and Franz and Cox (2012) suggest that a process or product only becomes a Disruptive Innovation when it provides new value through (a) affordability, (b) accessibility, (c) capacity, (d) responsiveness, (e) simplicity, or (f) customization. These characteristics served as the constructs for the statements in part 3 of the questionnaire. Individual statements were research-based and developed specifically for this questionnaire.

Select background characteristics of Iowa State University Extension and Outreach professionals (location of work, ISU Extension and Outreach educational area, highest level of education attained, years worked in Extension, age, and gender) were measured in part 4. These background characteristics were selected based on their influence on the willingness to adopt and perceptions of an innovation (Rogers, 2003). Participants were asked to provide their place of work from a drop-down list of the 100 Iowa County Extension Offices, the Iowa State University campus or out of state options. Participants were then asked to indicate

on which ISU Extension and Outreach educational area their primary work was focused (4-H Youth Development, Human Sciences, Agriculture and Natural Resources, Community and Economic Development or other). Educational attainment was measured using the highest degree attained (high school or GED, associate, bachelor's, master's, or Ph.D.). Respondents also reported the number of years they had been employed with Cooperative Extension and their current age in a provided text box.

In part 5 of the survey, participants were asked four open-ended questions and provided a text box to share their responses in an effort to obtain qualitative data on their decision to adopt, perceptions of eXtension and future of eXtension in an effort to enhance the quality of the study data. The questions included: (1) Why have you chosen to use, or not use, eXtension in your work with Iowa State University Extension and Outreach? (2) Iowa State University Extension and Outreach spends approximately $80,000 to support eXtension each year. Do you feel the money spent is a good investment for the organization and its clientele? (3) What do you believe is the future role of eXtension within Iowa State University Extension and Outreach? (4) In the space below, please include any further comments you wish to share regarding this survey or eXtension – America's Research-based Learning Network™. The questionnaire can be found in Appendix A.

Because this study of eXtension required the participation of human subjects, a request for exemption from the requirements of the human subject protections was submitted and approved by the Office for Responsible Research at Iowa State University in December 2013. The study was declared exempt because the data obtained through the study could not be directly linked back to the subjects and because participation in the study posed minimal risk to the human subjects.

To test for suitability and face validity, a group (n=5) of Agricultural Education and Studies graduate students at Iowa State University also completed the questionnaire. Further clarifying information and directions were included at the beginning of the questionnaire based on the feedback received from the students.

In an attempt to control measurement error as a threat to internal validity, a panel of experts recognized for their contributions to understanding the level of acceptance in using and delivering online learning among Extension professionals reviewed the online questionnaire for content and construct validity. These experts included professors at Iowa State University, Oregon State University, University of Georgia and a staff member for eXtension. The panel of experts concluded that the questionnaire was content and construct valid. Based on recommendations from the panel of experts, clarifying information was added to the instructions in the introduction of the questionnaire. Additional open-ended questions were also added to the questionnaire to enhance the survey's qualitative data. Table 1 shows how the theoretical framework and research questions which guided the development of the eXtension survey questions.

Table 1

Theoretical framework and research questions

Research Questions	Theoretical Framework	Survey Questions
1.)What are the personal characteristics of Iowa State University Extension and Outreach professionals?		1.) Where is your place of work located? 2.) My primary work is in the following Extension educational area: 3.) What is the highest level of education you have completed? 4.) What is your current age? 5.) How long have you worked for Cooperative Extension?
2.)What is Iowa State University Extension and Outreach professionals' current stage in the innovation-decision process of eXtension, based upon Li's adaptation of Rogers' (2003) stages in the innovation-decision process (no knowledge, knowledge, persuasion, decision, implementation, and confirmation)?	Diffusion of Innovations Theory (Rogers, 2003) explains consumers' five-point innovation-decision process: 1.) Knowledge 2.) Persuasion 3.) Decision 4.) Implementation 5.) Confirmation Li (2004) proposed a sixth stage (no knowledge) to include individuals who had not yet heard of an innovation.	1) Please indicate your use of eXtension: • I have never heard of eXtension prior to this study. • I understand the purpose of eXtension, but have not decided if I like the online technology. • I am familiar with eXtension. • I have decided if I will use eXtension. • I am using eXtension in my work. • I have used eXtension long enough to evaluate if the online tool will be part of my future work in Extension
3.) What are Iowa State University Extension and Outreach professionals' perceptions of eXtension based upon Rogers' (2003) characteristics of an innovation (relative advantage, compatibility, observability, complexity, and trialability)?	Diffusion of Innovations Theory (Rogers, 2003) is explained by five constructs: 1.) Relative Advantage 2.) Compatibility 3.) Observability 4.) Complexity 5.) Trialability	Relative Advantage • eXtension enhances the quality of work I do. • eXtension is a useful tool in delivering educational outreach to clientele. • eXtension increases accessibility to research-based information. • eXtension can enable Extension professionals to be more effective in their roles. Compatibility • eXtension supports my work. • eXtension supports the mission of Cooperative Extension. • eXtension helps me deliver programs based on the needs of clientele. • My vision for the future of Cooperative Extension includes eXtension. Complexity • Using eXtension is easy for me • eXtension is user-friendly. • I can find the information I am looking for using eXtension. • It is easy for me to find information using online resources Trialability • I have used the eXtension website. • I am able to experiment with eXtension. • I have used the Ask an Expert eXtension tool: • I have used the online courses eXtension tool: • I have used the Communities of Practice eXtension tool: • I have used the Communities of Interest eXtension tool: • I have used professional development resources in eXtension:

Table 1 *Continued*

Research Questions	Theoretical Framework	Survey Questions
		Observability • I have seen how other Extension professionals use eXtension in their work. • The official eXtension website is well-publicized. • eXtension is a highly visible resource for Extension professionals and clientele. • I have seen eXtension help ISUEO become more innovative • I have seen eXtension help ISUEO reach a more diverse customer base • I have seen eXtension broaden ISUEO's educational outreach to consumers not currently utilizing Extension resources • I have seen eXtension help ISUEO disseminate land-grant university knowledge to Iowans

Data Collection

The study instrument was assessed for reliability by conducting a pilot study with a randomized subsample of the population (n=30) to evaluate the proposed questionnaire and study implementation procedures (Dillman et al., 2009). The subsample of the survey population received a pre-notification email on June 3, 2014 from the Assistant Vice President for Organizational Development for Iowa State University Extension and Outreach who sent the pre-notification email to enhance the credibility of the study and to notify participants that they would be receiving the survey and reminders via email and mail from the study coordinator.

The pre-notification email explained the study and requested participation in completing an online questionnaire regarding the use of eXtension in their work. Providing a thorough explanation of the survey and its objectives enhanced the reliability of the study and its overall response rate. An invitation email was sent to the survey population four days later that included an explanation of why the participants' response was important in increasing the understanding of the role of eXtension in Iowa State University Extension and Outreach. The second mailing also included participant consent, approximate amount of time it would take to complete the questionnaire, a link to access the questionnaire and instructions for completing the questionnaire. The self-administered online questionnaire was developed in Qualtrics® and based on questionnaires created for similar research by Wells (2009), Harder and Linder (2007), and Moore and Benbasat (1991).

A reminder email was then sent one week following the questionnaire mailing. This email expressed appreciation for those who had responded to the survey request and indicated to those that had not yet completed the questionnaire, it was hoped that it would be completed soon.

The fourth contact reminded non-respondents that the open survey period would soon be ending and shared the importance of the individual's participation in the study. The third and fourth mailings also contained the participant consent, hyperlink to access the questionnaire as well as instructions for completing the questionnaire (Dillman et al, 2009).

In an effort to increase response rates and reduce the likelihood for coverage, nonresponse and measurement error, the fifth and final contact with the survey population was sent via postcard to distinguish the final contact from the regular email delivery (Dillman et al., 2009). The postcard was sent three weeks following the first, pre-notification email. The postcard contained a final reminder and explanation of why the non-respondent's particular response would be important to the study. The postcard contained a brief explanation of the study, a shortened hyperlink to access the questionnaire, and the survey coordinator's contact information. Because this study involved many different individuals from each of the four units within the Iowa State University Extension and Outreach organization, the pilot study served as the final test in determining if the exact procedures were appropriate for the larger study.

In the subsample (n=30) of the target population that was randomly selected to participate in the pilot study, one email failed due to an invalid address. A total of 17 Iowa State University Extension and Outreach professionals completed the questionnaire for a total response rate of 59% (n=17). Cronbach's (1951) alpha coefficients were calculated for each Likert scale to measure internal consistency (Moran et al., 2010). Cronbach's alpha was then also calculated following the entire target population's completion of the formal survey instrument to examine the consistency of the responses from the subsample (n=17) and the entire target population (N=975).

The alpha coefficient was used to describe the reliability of the Likert scales in the pilot and formal test. The higher the value, the more reliable the Likert scale. An alpha coefficient value of 0.7 has been found to be an acceptable level of reliability yet smaller values have been tested in the literature (Santos, 1999). The result of the Cronbach's alpha tests discovered that the pilot and formal studies were indeed reliable. Table 2 displays the internal consistency of each of the survey instrument constructs.

Table 2

Cronbach's alpha coefficients from the Pilot Test and Formal Studies

Study Constructs	Pilot test *n*=17 α	Formal Study *N*=975 α
Relative Advantage	.75[a]	.91
Compatibility	89	.87
Complexity	.77	.82
Trialability	.90	.85
Observability	.70[b]	.62
Disruptive Innovation	.69	.86

Note. Alpha coefficient ≥ .70 was considered an acceptable level of reliability.
[a]Original α was .67. One item was deleted.
[b]Original α was .69. One item was deleted.

The final survey instrument was distributed to the target population of Iowa State University Extension Professionals in July 2014. The survey was disseminated and data collected using the Tailored Design Method (Dillman et al., 2009). The Iowa State University Extension and Outreach Vice President for Organizational Development sent the pre-notification email on July 31, 2014 to the census survey population. On August 5, an invitation to participate in the study was sent which included information about the study, participant consent, the hyperlink to

access the questionnaire, and instructions for completing the questionnaire. The survey was sent to 945 Iowa State University email addresses.

Four reminders were sent on August 5, August 12, August 19, and August 26, 2014. The fifth and final contact with the population was sent via mailed postcard in an effort to distinguish the final contact from the regular email delivery. Conducting multiple and different methods of contact with the target population during the survey distribution period ensured respondents' participation in the study, kept dropout rates low and enhanced the external validity of the study (Dillman et al., 2009). The open survey period ended on September 2, 2014 at 12:00 a.m.

Respondents were not required to answer all questions as requiring answers may have increased the non-response and measurement error, outweighing the benefit of collecting responses for every question (Dillman et al., 2009). The questionnaire was designed so that respondents could skip questions they preferred not to answer. If the majority of the survey was submitted incomplete, an obvious response set was used, or if there is evidence of lying or cheating the questionnaire(s) was discarded. There were 21 questionnaires discarded due to a significant amount of missing data, which decreased the number of available responses to 429. A final response rate of 44% (n=429) was obtained and included the respondents from the pilot study.

The internal validity of the study could have been negatively impacted by respondents not fully understanding some directions or questions as well as the possibility that respondents may have given socially acceptable responses or lied in their survey responses. The questionnaire may have also encountered external validity weaknesses from instrumentation difficulties caused by the Qualtrics® software in addition to participants not being able to access, complete or submit the survey online.

Data Analysis

The Qualtrics® survey software collected the data produced by the questionnaire. Descriptive and inferential statistics were used in the Stata®/IC 12 statistical software program to analyze the survey data. Both quantitative and qualitative data analyses were conducted to strengthen the investigation of the study. The independent variables in the study were: (a) age, (b) years worked for Extension, (c) highest level of education attained, (d) educational area employed within Extension, (e) location of Extension employment, and (f) gender in addition to eXtension's perceived attributes: (g) relative advantage, (h) compatibility, (i) complexity, (j) trialability, (k) observability, (l) affordability, (m) accessibility, (n) capacity, (o) responsiveness, and (p) customization. The dependent variable was stage (Rogers, 2003; Li, 2004) in the Innovation-Decision Process, which comprised of six ordinal levels: (a) no knowledge, (b) knowledge, (c) persuasion, (d) decision, (e) implementation, and (f) confirmation.

Results of the five-point Likert scale opinion rating scores (1=*Strongly Disagree,* 2=*Disagree,* 3=*Neither Agree nor Disagree,* 4=*Agree*, 5=*Strongly Agree*) were interpreted in the analysis of the study as being negatively perceived (score of 1.0-2.49), neutrally perceived (2.5-3.5) and positively perceived (3.51-5.0).

The open-ended questions in the study were also analyzed using qualitative research methods. In the review of the data, relationships among each of the statements were analyzed to identify themes, connections and categories (Maxwell, 2013). The data from the questions were then open coded by the researcher. Themes were then sorted into clusters based on respondents' perceptions, awareness and use of eXtension.

Objective 1: Describe the background characteristics of Iowa State University Extension and Outreach professionals.

Frequencies and percentages were used to describe the background characteristics (educational area of Extension, location of employment, gender, age, years of employment in Cooperative Extension, and educational attainment) of Iowa State University Extension and Outreach professionals participating in the study.

Objective 2: Describe Iowa State University Extension and Outreach professionals' current stage in the innovation-decision process of eXtension, based upon Li's adaptation of Rogers' (2003) stages in the innovation-decision process (no knowledge, knowledge, persuasion, decision, implementation, and confirmation).

Frequencies and percentages were used to describe Iowa State University Extension and Outreach professionals' stage in the innovation-decision process (no knowledge, knowledge, persuasion, decision, implementation, and confirmation). The innovation-decision stage was considered the dependent variable. The open-ended question that described respondents' stage of adoption was also analyzed using qualitative research methods. Relationships among each of the statements were analyzed to identify themes, connections and categories. Data from the questions were then open coded by the researcher. Themes were then sorted into clusters based on respondents' perceptions, awareness and use of eXtension.

Objective 3: Describe Iowa State University Extension and Outreach professionals' perceptions of eXtension based upon Rogers's (2003) characteristics of an innovation (relative advantage, compatibility, observability, complexity, and trialability).

Iowa Extension professionals' perceptions of eXtension based upon Rogers's (2003) characteristics of an innovation were described by summating the responses of the Likert scale data for each of the individual statements within each construct (a) relative advantage, (b) compatibility, (c) observability, (d) complexity, (e) trialability, (f) affordability, (g) accessibility,

(h) capacity, (i) responsiveness, and (j) customization from each participant. The mean and standard deviation was then calculated for each of the summated scores for every construct from each participant in the study.

Objective 4: Describe Iowa State University Extension and Outreach professionals' perceptions of eXtension based on Christensen's (1997) characteristics of a disruptive innovation (affordability, accessibility, capacity, responsiveness, or customization).

Iowa Extension professionals' perceptions of eXtension based upon Christensen's (1997) characteristics of a disruptive innovation were described by calculating the individual Likert-type data for each construct (a) affordability, (b) accessibility, (c) capacity, (d) responsiveness, (e) simplicity and (f) customization from each participant. The median, frequencies and percentages were calculated for each of the individual scores for every construct in the study. The open-ended question that described respondents' perceived affordability was also assessed using qualitative research methods. Relationships among each of the statements were analyzed to identify themes, connections and categories. Data from the questions were then open coded by the researcher. Themes were then sorted into clusters based on respondents' perceptions, awareness and use of eXtension.

Objective 5: Describe the correlation between Iowa State University Extension and Outreach professionals' selected background characteristics (age, gender, education, educational attainment, and years of employment in Cooperative Extension) and their perceptions of eXtension based on the Diffusion of Innovations Theory (Rogers, 2003) and the Disruptive Innovation Theory (Christensen, 1997).

Correlational statistics (Pearson product moment correlation (r) coefficient, point biserial correlation (r_{pb}), Cramer's V (φ_c), and Spearman rank order correlation (r_s),) were used to measure the associations between Iowa State University Extension and Outreach professionals'

selected background characteristics (i.e., age, gender, education, and years of employment in Extension) and their perceptions of eXtension based on the characteristics (a) relative advantage, (b) compatibility, (c) observability, (d) complexity and (e) trialability of the diffusion of innovations theory (Rogers, 2003) and characteristics of Christensen's (1997) disruptive innovation theory: (a) affordability, (b) accessibility, (c) capacity, (d) responsiveness, (e) customization.

Objective 6: Determine whether Iowa State University Extension and Outreach professionals' perceptions of eXtension based upon Rogers's (2003) and Christensen's (1997) characteristics of an innovation predict the stage of adoption Rogers's (2003) innovation-decision process.

A binary logistic regression was conducted to assess whether the perceptions of eXtension based upon the characteristics of Rogers's diffusion of innovations (2003) and Christensen's disruptive innovation (1997) characteristics (relative advantage, compatibility, complexity, trialability, observability, affordability, accessibility, capacity, responsiveness, customization) predicted the stage of adoption in the innovation-decision process (Rogers, 2003; Li, 2004) at the awareness level (knowledge, persuasion) or adoption level (decision, implementation, confirmation).

CHAPTER 4. FINDINGS

This chapter presents the rate of response, comparison of early to late respondents, and the findings based on each of the six research objectives in the study.

Response Rate

The target population for this census survey was Iowa State University Extension and Outreach professionals. According to the Iowa State University Extension and Outreach staff directory, there were 1,017 faculty and staff employed within the organization between June and August 2014 when the pilot and formal studies were conducted. During this time, the Center for Industrial Research and Service (CIRAS) disbanded from the Iowa State University Extension and Outreach organization. There were 42 CIRAS staff removed from the target population, which resulted in a total population of 975 available for the participation in the census survey. A subsample (n=30) of the target population was randomly selected to participate in the pilot study. A total of 17 Iowa State University Extension and Outreach professionals completed the pilot study for a total response rate of 59% (n=17). The respondents and non-respondents from the pilot study were not surveyed again in the formal study.

Following the distribution of the emailed survey, three reminder emails and one mailed postcard were then sent to the survey population's non-respondents to increase the overall response rate. There were 21 responses removed due to a significant amount of missing data, which decreased the number of usable responses to 429. A final response rate of 44% (n=429) was attained and included the respondents from the pilot study.

Non-Response Error

Early survey respondents (first two weeks) were compared to late respondents (last two weeks) in an attempt to control for nonresponse error and to enhance the external validity of the study (Miller & Smith, 1983). There were 429 respondents who were identified in the combined pilot and formal studies as early respondents (n=350) or late respondents (n=79). Respondents could select only one stage in the innovation-decision process. Table 3 displays frequencies, percentages, Cramer's V, chi-square and the p-value for the comparison of early to late respondents on the variable stage in the innovation-decision process. Early and late respondents were not significantly different on the variable stage in the innovation-decision process.

Table 3

Comparison of early and late respondents' stage in the Innovation-Decision Process

Respondents stage in innovation-decision process	Early f	Early %	Late f	Late %
No Knowledge	77	22.2	32	40.5
Knowledge	54	15.6	14	17.7
Persuasion	120	34.6	19	24.1
Decision	3	00.9	0	00.0
Implementation	55	16.1	9	11.4
Confirmation	37	10.7	5	6.3

Note. p <.05; Cramer's V= .185; Chi-Square=14.78; p =.07.

T-tests were used to determine if significant differences existed between early and late respondents on: (1) their perceptions of eXtension based on interval data from the diffusion of innovations theory constructs; (2) their age; and (3) the number of years of employment in Cooperative Extension. Table 4 shows the means, standard deviations, t-tests and p-values for each of the variables. Statistically significant differences were not found between early and late respondents' on their perceptions of the diffusion of innovation theory constructs (relative

advantage, compatibility, complexity, trialability, and observability), age, or years of employment in Extension.

Table 4

Comparison of early and late respondents on interval data

Respondents perceptions of eXtension and selected background characteristics	Early *M*	Early *SD*	Late *M*	Late *SD*	t-test	*p*-value
Diffusion of Innovations						
Relative Advantage	3.53	.74	3.53	.88	-.03	.98
Compatibility	3.44	.75	3.59	.81	-1.22	.22
Complexity	3.42	.66	3.61	.72	-1.76	.08
Trialability	2.79	.75	2.69	.91	.76	.45
Observability	3.01	.66	3.09	.79	- .74	.46
Age	45.94	13.07	47.22	13.53	-.72	.47
Years of Employment in Extension	9.96	9.77	9.89	9.48	.06	.95

Note. $p < .05$.

Cramer's V and chi-square was used to determine if significant differences existed between early and late respondents on (1) their perceptions of eXtension based on ordinal data from the disruptive innovation theory constructs; (2) location of employment; (3) educational area of employment; and (4) educational attainment. Table 5 shows the Cramer's V, chi-square and *p*-values for each of the variables. A statistically significant difference was found between early and late respondents' on educational attainment.

Table 5

Comparison of early and late respondents on ordinal data

Respondents background characteristics and perceptions of eXtension	Cramer's V	*Chi-Square*	*p*-value
Disruptive Innovation			
Affordability	.09	2.25	.69
Accessibility	.08	1.71	.79
Capacity	.10	3.01	.56
Responsiveness	.09	2.04	.73
Customization	.10	2.59	.63
Location	.10	3.24	.66
Educational Area	.11	4.13	.39
Educational Attainment	.20	14.12	.02

Note. $p < .05$.

Table 6 shows the phi coefficient, Chi-square and *p*-value for the association between gender and response. There was no statistically significant difference between early and late respondents on gender.

Table 6

Comparison of early and late respondents' gender

Respondents' gender	*Phi*	*Chi-Square*	*p*-value
Gender	.01	.05	.81

Note. $p < .05$.

The comparisons of early and late respondents suggest that the results are generalizable to the entire Iowa State University Extension and Outreach population with one caveat. Results for the educational attainment variable are only true for early respondents.

Findings

Objective 1: Describe the background characteristics of Iowa State University Extension and Outreach professionals.

Frequencies and percentages were used to describe the background characteristics (educational area of Extension, location of employment, gender, age, years of employment in Cooperative Extension, and educational attainment) of Iowa State University Extension and Outreach professionals participating in the study.

Educational area

Respondents (*n*=371) indicated that their primary work aligned with one of the four Iowa State University Extension and Outreach educational areas. Table 7 displays the frequencies and percentages of Iowa Extension professionals' selected educational area of employment in Iowa State University Extension and Outreach. The highest number of respondents (*n*=100, 26.95%) indicated that their primary work responsibilities were in the Agriculture and Natural Resources educational area. This aligns with current data indicating that Agriculture and Natural Resources is the largest educational area within Iowa State University Extension and Outreach with 244 employees located in county extension offices across the state and on the Iowa State University campus (K. Black, personal communication, October 20, 2014). In addition, 34 of the 45 available Communities of Practice are on topics related to agriculture and natural resources, making it more beneficial for Agriculture and Natural Resources to utilize eXtension than Iowa Extension's three other educational areas (eXtension, 2014).

The educational area "Other" response were selected by more than a quarter of participants (*n*=98, 26.42%). Respondents could indicate their other area of work that they felt did not align with one of the four educational areas in a provided text box. The largest number of

text-based responses, included: office assistant (*n*=12), administration (*n*=10), a combination of one or more educational areas (*n*=8), county or regional director (*n*=6), Organizational Advancement (*n*=5), and information technology (*n*=5). Respondents (*n*=91) from the 4-H Youth Development educational area also represented a large portion of the population. The Human Sciences (*n*=58) and Community and Economic Development (*n*=24) educational areas also had significant representation from the survey population.

Table 7

Distribution of Iowa State University Extension professionals' educational areas of employment

Iowa State University extension and outreach educational area	Frequency	Percentage
Agriculture and Natural Resources	100	26.95
Other	98	26.42
4-H Youth Development	91	24.53
Human Sciences	58	15.63
Community and Economic Development	24	6.47

Note. *n*=371.

Location of employment

Results of the study revealed that respondents' (*n*=351) main location of employment with Iowa State University Extension and Outreach occurred throughout the state at county extension offices and on the Iowa State University campus. Table 8 displays the frequencies and percentages of Iowa Extension professionals' geographic location of employment. A high number of respondents' main location of employment (*n*=238, 67.8%) was shown to be at one of the 100 county-based extension offices located across the state. The counties reporting the largest participation, included: Dickinson, Henry, Johnson, Linn, Polk, Story and Woodbury counties.

These high rates of response align with data indicating a high level of employment in the local county extension office (K. Black, personal communication, October 20, 2014).

The region reporting the highest rate of response (*n*=25, 7.1%) was Region 13, which included Dallas, Polk, Warren and Madison counties. Again, this region and its county extension offices employ and house a large number of state and county extension professionals given its close proximity to the state's capitol, largest metropolitan area and central location. In addition, Region 13 (Dallas, Polk, Warren and Madison counties) is the most populous region in the state, containing 19% (589,102) of the state's population totaling more than 3 million citizens (U.S. Census Bureau, 2010). Iowa Extension professionals participating in the study resided and worked throughout the state of Iowa in areas with a wide range in population and wealth.

Table 8

Distribution of respondents by location of employment

Employment location	Frequency	Percentage
Iowa Extension Regions	238	67.8
Region 1	17	04.8
Region 2	8	02.3
Region 3	13	03.7
Region 4	10	03.0
Region 5	13	03.7
Region 6	10	02.8
Region 7	9	02.6
Region 8	15	04.3
Region 9	10	02.8
Region 10	10	02.8
Region 11	8	02.3
Region 12	14	03.9
Region 13	25	07.1
Region 14	12	03.4
Region 15	10	02.8
Region 16	9	02.6
Region 17	12	03.4
Region 18	11	03.1
Region 19	8	02.3
Region 20	14	03.9
Iowa State University Campus	113	32.1
Out of State	0	00.0

Note. n=351.

Gender

Table 9 illustrates the distribution of respondents (n=386) by gender. There were 283 (73.3%) females and 103 (26.7%) males.

Table 9

Distribution of Iowa extension professionals by gender

Gender	Frequency	Percentage
Male	103	26.7
Female	283	73.3

Note. n=386.

Age

Participants reported their age in a textbox provided in the online questionnaire. Table 10 provides the frequencies and percentages of respondents' age. The ages of Iowa Extension professionals (*n*=339) participating in this study ranged from 21-74. The mean age of respondents was 46 years (*SD*=12.92). The highest number of respondents (*n*=108) were between the ages of 54-64. There were eighty respondents (23.60%) that indicated they were between the ages of 43-53 and seventy-four respondents (21.83%) between the ages of 32-42. Fifty-nine respondents (17.40%) reported being 21-31 years of age. The fewest number of professionals (*n*=18, 5.31%) reported being in the age range of 65-75 years.

Table 10

Distribution of Iowa extension professionals by age

Age in years	Frequency	Percentage
21-31	59	17.40
32-42	74	21.83
43-53	80	23.60
54-64	108	31.86
65-75	18	5.31

Note. *n*=339; *M*=46.37; *SD*=12.92.

Years of employment

Iowa Extension professionals' (*n*=365) reported their years of employment with Cooperative Extension ranged from < 1 to 49 years. Table 11 shows the frequency, percentage and cumulative percentage of respondents' years of employment with Cooperative Extension. The mean number of years of employment with Cooperative Extension was 9.89 with a standard deviation of 9.76. Half of the respondents (*n*=221, 60.54%) indicated being employed with

Cooperative Extension for nine years or less. Eighty-seven (23.84%) of the Iowa Extension professionals indicated that they had been employed with Cooperative Extension for 10-20 years and forty-three (11.78%) professionals for 21-31 years. There were 13 (3.56%) professionals who indicated being employed with Extension for 32-42 years. One respondent (*n*=1, .28%) reported having been employed with Cooperative Extension for 43-53 years.

Table 11

Distribution of Iowa extension professionals by years of employment with cooperative extension

Years of employment	Frequency	Percentage	Cumulative percentage
0-9 years	221	60.54	60.54
10-20	87	23.84	84.38
21-31	43	11.78	96.16
32-42	13	3.56	99.72
43-53	1	0.28	100.00

Note. *n*=365; *M*=9.89; *SD*=9.76.

Educational attainment

Table 12 shows the educational attainment of participants (*n*=372). The highest educational attainment for 133 Iowa Extension professionals' was a Bachelor's degree (35.75%). There were 132 respondents who indicated attaining a Master's degree (35.48%). The highest educational attainment for 44 (11.83%) of the respondents was a Ph.D. There were 27 (7.26%) respondents whose highest degree was an Associate degree and 28 respondents (7.53%) who had completed some higher education but did not received a degree. Eight respondents (2.15%) reported that they had received a high school diploma or its equivalent.

Table 12

Distribution of Iowa extension professionals by highest level of education

Highest Level of Education	Frequency	Percentage	Cumulative percentage
High school diploma or equivalent	8	2.15	2.15
Some college but no degree	28	7.53	9.68
Associate degree	27	7.26	16.94
Bachelor's degree	133	35.75	52.69
Master's degree	132	35.48	88.17
Ph.D.	44	11.83	100.00

Note. n=372.

Objective 2:

Describe Iowa State University Extension and Outreach professionals' current stage in the innovation-decision process of eXtension, based upon Li's adaptation of Rogers' (2003) stages in the innovation-decision process (no knowledge, knowledge, persuasion, decision, implementation, and confirmation).

Frequencies and percentages were used to describe Iowa State University Extension and Outreach professionals' stage in the innovation-decision process (no knowledge, knowledge, persuasion, decision, implementation, and confirmation). The innovation-decision stage was considered the dependent variable. The open-ended question that described respondents' stage of adoption was also analyzed using qualitative research methods. Relationships among each of the statements were analyzed to identify themes, connections and categories. Data from the questions were then open coded by the researcher. Themes were then sorted into clusters based on respondents' perceptions, awareness and use of eXtension.

Respondents (n=429) selected one statement that best aligned with their current stage of adoption in Rogers's (2003) Innovation-Decision Process. Table 13 reveals the percentage of Iowa Extension professionals at each stage in the innovation-decision process regarding their use and adoption of eXtension. A high number of respondents (n=139, 32.63%) reported that they

are familiar with eXtension (persuasion stage). However, 25.59% of Iowa Extension Professionals (*n*=109) remain at the no knowledge stage as they indicated that they had never heard of eXtension prior to this study. Sixty-eight respondents (15.96%) reported that they understood the purpose of eXtension, but had not decided if they liked the technology—the knowledge stage of the innovation-decision process while sixty-five Iowa Extension professionals (15.26%) shared that they are using eXtension in their work (implementation stage). Less than 10% (*n*=42) of the respondents reported being at the confirmation stage—having used the eXtension technology long enough to determine if it will be a part of their future work. Three respondents (.01%) reported that they had made the decision to further their adoption or rejection of eXtension in their work—the decision stage of the innovation-decision process.

Table 13

Distribution of Iowa Extension professionals' stage in the innovation-decision process

Stage	Statements	*Frequency*	Percent	Cum. percent
No knowledge	I have never heard of eXtension prior to this study.	109	25.59	25.59
Knowledge	I understand the purpose of eXtension, but have not decided if I like the online technology.	68	15.96	41.55
Persuasion	I am familiar with eXtension.	139	32.63	74.18
Decision	I have decided if I will use eXtension.	3	.70	74.88
Implementation	I am using eXension in my work.	65	15.26	90.14
Confirmation	I have used eXtension long enough to evaluate if the online tool will be part of my future work in Extension.	42	9.86	100.00

Note. n=429.

The online study also included an open-ended question which asked Iowa Extension professionals, "Why have you chosen to use, or not use eXtension in your work?" The open-ended responses (*n*=303) provided textual data on the reasons why Iowa Extension professionals have chosen to adopt or reject the online resource. The responses from study participants varied from those who are utilizing eXtension in their work (*n*=112*)* to those who had never heard of eXtension (*n*=88) or have chosen not to adopt the technology (*n*=103).

A significant number of respondents shared that they are using eXtension in their work for similar reasons, such as, "…*to expand my network of professional colleagues and technical resources"* in addition to, *"I primarily use eXtension as a secondary resource for specific client questions if I can't find the information or answers I am looking for within ISU Extension resources."*

One Iowa Extension professional shared the following in regards to the types of tools and resources they were utilizing in eXtension:

> *When I have a specific client question, I will search eXtension for materials if ISUEO doesn't have a publication or reference in their files. I will check the site (www.extension.org) for handouts or materials when building a program. I will also check the site for answers and have contributed to the Ask the Expert. I have taken advantage of "learn" activities for Professional Development and watched live stream of some conferences. I reference eXtension.org as a client resource in program presentations* (Iowa Extension professional, 2014).

Respondents were found to use eXtension to enhance their own professional development and skill growth as well as to provide greater research-based information to clientele, *"…customers care that they get correct, quality, accurate information. Extension has that reputation. Our nation-wide Extension brand is strengthened when we work together with other states."*

However, many respondents (*n*=103) shared why Iowa Extension professionals were choosing not to use eXtension, including the common response, *"I have not made the time and it was not part of my orientation. It has not seemed to be a priority within our unit. If someone had walked me through the website and how to use it, I would likely access it more."* Many respondents also shared their feelings that indicated time, human and financial resources should be invested in the ISU Extension and Outreach website rather than providing funding to support the national eXtension online resource. *"I believe we get more 'hits' and 'downloads' from our own websites and we can control its look, messaging, and content much better,"* as well as *"simply compare it to some of the innovative websites that provide unbiased, research based information-eXtension falls far short and is not a good investment of ISU Extension dollars."*

Respondents not using eXtension also shared that they found the technology to be, *"…cumbersome, doesn't offer more than institutional webpages, presents information in ways that can be confusing."* Further, these respondents did not find eXtension to have topics related to their area of interest. They also indicated that they had not received adequate training on how to use eXtension and it was not promoted within the organization. Many respondents shared that, *"…my position does not require the use of eXtension."*

The open-ended responses align with the results of the level of adoption of eXtension using the innovation-decision stage above. About one-quarter of the respondents completing the open-ended questions shared that they had no knowledge of eXtension. In addition, those individuals who shared in the open-ended response that they have adopted and are using eXtension in their work (37%, *n*=112) is consistent with the frequencies and percentages shown in the quantitative results of the innovation-decision process in Table 13.

Objective 3: Describe Iowa State University Extension and Outreach professionals' perceptions of eXtension based upon Rogers's (2003) characteristics of an innovation (relative advantage, compatibility, observability, complexity, and trialability).

Iowa Extension professionals' perceptions of eXtension based upon Rogers' (2003) characteristics of an innovation were assessed within each of the following constructs: (a) relative advantage, (b) compatibility, (c) observability, (d) complexity, and (e) trialability from each participant. The mean and standard deviation was calculated for each of the summated scores for the statements that comprised each construct in the study.

The survey instrument was comprised of Likert scale statements, which participants' responded to using the following scale: 1=*Strongly Disagree,* 2=*Disagree,* 3=*Neither Agree nor Disagree,* 4=*Agree*, 5=*Strongly Agree*. The mean and standard deviation was calculated for each of the five innovation characteristic constructs.

Table 14 displays the means and standard deviations of Iowa Extension professionals' perceived characteristics of an innovation. Results of the study show that Iowa Extension Professionals (n=306) had neutral perceptions of eXtension's perceived compatibility (M=3.47, SD=.76) and complexity (M=3.44, SD=.68), observability (M=2.60, SD=.74) and trialability (M=2.76, SD=.79) constructs as professionals neither agreed nor disagreed that they were characteristics evident in the eXtension technology. Respondents had favorable perceptions of the relative advantage (M=3.54, =.75) attribute of eXtension.

Table 14

Iowa Extension professionals' perceptions of eXtension using Diffusion of Innovations theory

Innovation characteristics	*N*	*M*	*SD*
Relative Advantage	300	3.54	.75
Compatibility	298	3.47	.76
Complexity	297	3.44	.68
Observability	290	2.60	.74
Trialability	298	2.76	.79

Note. 1=Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4=Agree, 5=Strongly Agree.

Relative advantage

Table 15 provides the sample size and percentage of respondents who strongly disagreed, disagreed, neither agreed nor disagreed, agreed, and strongly agreed with each of the statements within the relative advantage construct. Iowa Extension professionals reported favorable perceptions of eXtension's perceived relative advantage (M=3.54, SD= .75). The highest number of Iowa State University Extension and Outreach professionals (n=302) indicated that they neither agreed nor disagreed that eXtension enhanced their quality of work (n=111, 37%). The largest representation of the population agreed that eXtension was a useful tool in delivering educational outreach to clientele (n=138, 46%); increased accessibility to research-based information (n=155, 52%); and enabled Extension professionals to be more effective in their roles (n=142, 47%).

Table 15

Iowa Extension professionals' perceived relative advantage of eXtension

Relative advantage	*n*	Percentage				
		SD	D	NA/D	A	SA
eXtension enhances the quality of work I do.	302	4	10	44	37	6
eXtension is a useful tool in delivering educational outreach to clientele.	302	4	7	34	46	10
eXtension increases accessibility to research-based information.	299	2	5	27	52	14
eXtension can enable Extension professionals to be more effective in their roles.	300	2	5	35	47	11

Note. SD=Strongly Disagree, D=Disagree, NA/D=Neither Agree nor Disagree, A=Agree, SA=Strongly Agree.

Compatibility

Table 16 provides the sample size and percentage of respondents who strongly disagreed, disagreed, neither agreed nor disagreed, agreed, and strongly agreed with each of the statements within the compatibility construct. Iowa State University Extension and Outreach professionals neither agreed nor disagreed (M=3.47, SD=.76) that eXtension was perceived to be compatible with their work and the work of the organization.

Within the compatibility Likert scale statements, the highest number of respondents agreed that eXtension supported their work (n=113, 38%); and supported the mission of Cooperative Extension (n=163, 55%); and was a part of their vision for the future of Cooperative Extension (n=118, 40%). The largest representation of respondents neither agreed nor disagreed that eXtension helped them deliver programs based on the needs of clientele (n=144, 48%).

Table 16

Iowa Extension professionals' perceived compatibility of eXtension

Compatibility	*n*	Percentage				
		SD	D	NA/D	A	SA
eXtension supports my work.	299	5	13	36	38	9
eXtension supports the mission of Cooperative Extension.	297	1	0	24	55	20
eXtension helps me deliver programs based on the needs of clientele.	298	5	15	48	25	7
My vision for the future of Cooperative Extension includes eXtension.	298	3	9	38	40	11

Note. SD=Strongly Disagree, D=Disagree, NA/D=Neither Agree nor Disagree, A=Agree, SA=Strongly Agree.

Complexity

Respondents indicated neither agreeing nor disagreeing that the eXtension technology was complex (*M*=3.44, *SD*=.68). The complexity construct is the only one of Rogers's five innovation characteristics that is perceived as negative. "The complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption" (Rogers, 2003. p. 257). The statements included in the complexity construct actually measured simplicity, the opposite of complexity. Hence, high rankings on the complexity construct indicated that Iowa Extension professionals tended to perceive the technology to be a simpler rather than a more complex technology to use.

Table 17 provides the sample size and percentage of respondents who strongly disagreed, disagreed, neither agreed nor disagreed, agreed, and strongly agreed with each of the statements within the complexity construct. The highest number of Iowa Extension professionals' indicated that they neither agreed nor disagreed that eXtension was easy for them to use (*n*=124, 42%); user-friendly (*n*=136, 46%); or easy to find the information they were looking for using eXtension (*n*=147, 49%). Yet, in the last complexity Likert scale statement respondents were

asked a more broad statement pertaining to their overall use of online resources—"using online resources to access information is easy for me." A significant number of respondents agreed (n=147, 49%) and strongly agreed (n=81, 27%) with the statement indicating that respondents' perceived themselves as familiar with using online technologies to find information on the internet. This statement was included in an effort to assess respondents' confidence using not only eXtension, but other online technologies as well in their work. A similar non-eXtension, complexity Likert-Scale statement was also included Harder's (2007) study of eXtension.

Table 17

Iowa Extension professionals' perceived complexity of eXtension

		Percentage				
Complexity	*n*	SD	D	NA/D	A	SA
Using eXtension is easy for me	298	4	13	42	36	6
eXtension is user-friendly.	297	3	13	46	34	5
I can find the information I am looking for using eXtension.	297	3	11	49	32	4
Using online resources to access information is easy for me.	297	0	2	21	49	27

Note. SD=Strongly Disagree, D=Disagree, NA/D=Neither Agree nor Disagree, A=Agree, SA=Strongly Agree.

Observability

Table 18 shows the sample size and percentage of the statements in the observability construct. Results of the study revealed that Iowa Extension professionals neither agreed nor disagreed eXtension was perceived to exhibit a high degree of observability (M=2.60, SD=.74). The decision to adopt or reject an innovation is influenced by an individual's ability to observe other members of a social system utilizing the innovation (Rogers, 2003). The highest number of respondents perceived the eXtension technology to lack observability as respondents' indicated that they were not able to see how other Extension professionals used eXtension in their work

(*n*=95, 33%). Respondents also did not perceive the eXtension website to be well-publicized (*n*=128, 44%) nor was it found to be a highly visible resource for Extension professionals and clientele (*n*=112, 39%). The largest number of study respondents indicated that they had seen eXtension broaden the educational outreach of the organization (*n*=120, 42%) and disseminate university knowledge to clientele (*n*=123, 43%). However, the largest number of participants neither agreed nor disagreed that eXtension was seen as a resource that helps Iowa State University Extension and Outreach become more innovative (*n*=127, 44%) and reach a more diverse customer base (*n*=129, 45%).

Table 18

Iowa Extension professionals' perceived observability of eXtension

		Percentage				
Observability	*n*	SD	D	NA/D	A	SA
I have seen how other Extension professionals use eXtension in their work.	291	8	33	24	29	6
The official eXtension website is well-publicized.	289	13	44	32	9	1
eXtension is a highly visible resource for Extension professionals and clientele.	288	14	39	32	13	2
I have seen eXtension help Iowa State University Extension and Outreach become more innovative.	289	6	11	44	31	7
I have seen eXtension help Iowa State University Extension and Outreach reach a more diverse customer base.	288	5	9	45	34	8
I have seen eXtension broaden Iowa State University Extension and Outreach's educational outreach to potential clientele not currently using eXtension resources.	286	3	8	41	42	6
I have seen eXtension help Iowa State University Extension and Outreach disseminate land-grant university knowledge to clientele.	287	3	7	38	43	9

Note. SD=Strongly Disagree, D=Disagree, NA/D=Neither Agree nor Disagree, A=Agree, SA=Strongly Agree.

Trialability

Table 19 illustrates the sample size and percentages of the statements in the observability construct. The results of the study show that Iowa Extension professionals neither agreed nor disagreed that eXtension was perceived to exhibit characteristics of trialability within its technology (*M*=2.76, *SD*=.79) as indicated in their results of the Likert scale statements that made up the trialability construct (1=*Strongly Disagree,* 2=*Disagree,* 3=*Neither Agree nor Disagree,* 4=*Agree*, 5=*Strongly Agree)*. Participants were asked a series of seven Likert scale statements to determine whether or not Iowa Extension professionals have had the opportunity to experiment with eXtension and if they had used any of its major tools or available resources. More than half of the respondents agreed that they had used the technology (*n*=154, 53%). Yet, the highest number of respondents neither agreed nor disagreed that they were able to experiment with eXtension before deciding whether to adopt or reject the technology (*n*=137, 47%). Most of the respondents were also shown to disagree with the statements asking whether they had used or contributed to the eXtension tools identified in the survey. These tools included the 'Ask the Expert' (*n*=115, 40%), online courses (*n*=141, 49%), Communities of Practice (*n*=123, 43%), Communities of Interest (*n*=135, 47%), and professional development resources (*n*=122, 41%).

Table 19

Iowa Extension professionals' perceived trialability of eXtension

Trialability	*n*	Percentage				
		SD	D	NA/D	A	SA
I have used eXtension.	292	7	13	12	53	16
I am able to experiment with eXtension.	290	2	12	47	34	5
I have used the Ask the Expert eXtension tool.	288	14	40	16	24	7
I have used the online courses eXtension tool.	290	14	49	20	14	3
I have used the Communities of Practice eXtension tool.	288	14	43	18	22	4
I have used the Communities of Interest eXtension tool.	287	15	47	22	14	2
I have used professional development resources in eXtension.	297	16	41	16	22	4

Note. M=2.76; SD=.79; SD=Strongly Disagree, D=Disagree, NA/D=Neither Agree nor Disagree, A=Agree, SA=Strongly Agree.

Objective 4: Describe Iowa State University Extension and Outreach professionals' perceptions of eXtension based on Christensen's (1997) characteristics of a disruptive innovation (affordability, accessibility, capacity, responsiveness, or customization).

Iowa Extension professionals' perceptions of eXtension based upon Christensen's (1997) characteristics of a disruptive innovation were described by assessing the individual Likert-type data for the (a) affordability, (b) accessibility, (c) capacity, (d) responsiveness, and (e) customization attributes from each participant. The median, mode, frequencies and percentages were calculated for each of the individual Likert-type items. The open-ended question that described respondents' perceived affordability was also assessed using qualitative research methods. Relationships among each of the statements were analyzed to identify themes, connections and categories. Data from the questions were then open coded by the researcher. Themes were then sorted into clusters based on respondents' perceptions, awareness and use of eXtension.

Affordability

Table 20 provides the sample size, median, frequencies and percentages for the affordability Disruptive Innovation attribute. Results of the study show that the highest number of Iowa Extension professionals neither agreed nor disagreed that eXtension was perceived to be an affordable technology for Iowa State University Extension and Outreach (*n*=125, 44%).

Table 20

Iowa Extension professionals' perceived affordability of eXtension

Affordability	Frequency	Percentage
Strongly Disagree	7	2
Disagree	18	6
Neither Agree Nor Disagree	125	44
Agree	109	38
Strongly Agree	25	9

Note. *n*=284; Median=3; 1=Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4=Agree, 5=Strongly Agree.

The study also included an open-ended question. "Iowa State University Extension and Outreach spends approximately $80,000 to support eXtension each year. Do you feel the money spent is a good investment for the organization and its clientele?" The open-ended responses (*n*=237) provided textual data on whether Iowa Extension professionals perceived eXtension to be an affordable resource. The responses from study participants varied from those who felt that eXtension was a good investment (*n*=108) to those who weren't sure (*n*=75), or did not believe the approximate $80,000 assessment was a good investment (*n*=54).

Some respondents who perceived eXtension to be an affordable resource shared that the technology was a valuable tool to Iowa's county Extension offices because it is available "*24/7/365 and spreads the word that ISU Extension and Outreach is doing inside and outside of*

the state." One respondent indicated that eXtension, "*…is one more tool in our toolbox that helps us to be effective in our work*." Another county Extension professional shared that,

> *We have clients call for a variety of information and sometimes we can use ISU to refer people to for information they are seeking. Now can refer them to the internet pages for more information on what they are looking for in resources* (Iowa Extension professional, 2014).

However, some respondents who found eXtension to be affordable also indicated that further work needs to be done to educate professionals on how to use the technology and promote its use within the organization. "*...there need to be workshops on usage. Need to learn how to use eXtension more efficiently*." One respondent shared, "*I think it should be promoted more and included in staff onboarding and training*."

Yet, 22% of the respondents (n=54) shared that they did not perceive it to be an affordable resource for Iowa State University Extension and Outreach. Respondents shared that these negative perceptions were due to the fact that no one within the organization "*…took the time to show staff how to use eXtension or understand its benefits*." Other respondents shared that they didn't understand why an assessment was being paid "*...on a program that obviously is not being used or promoted*."

Some respondents felt that it was not a good investment of both time and money and that the assessment could be spent elsewhere in the organization. The phrase "*we can do it ourselves much better*" was also shared by multiple respondents. Yet some professionals also suggested using the $80,000 to invest in improving the Iowa State University Extension and Outreach website or to enhance the organization's presence in search engines results instead.

> *Invest in search engine optimization strategies and improve sites visibility like the publications online store that have a mountainous amount of information that should be shared with ISUEO's clientele. If the public can't search and find ISUEO -- we're sunk. Period* (Iowa Extension Professional, 2014).

Some Iowa Extension professionals shared that they hadn't used the online resource in years, which made them question the value of the technology to others within the organization. One respondent shared that they were not using eXtension and instead just searching for research-based information online. "*I find research-based information using a search engine by creating a unique search phrase like adding in 'edu'.*"

In addition, some respondents (*n*=75) indicated that they just were not aware or did not feel informed enough to share an opinion about the value of the financial investment of eXtension within Iowa State University Extension and Outreach.

Accessibility

Table 21 provides the sample size, median, frequencies and percentages for the perceived accessibility of the disruptive innovation construct. Iowa Extension and Outreach professionals (*n*=286) perceived eXtension to be an accessible technology. The highest number of respondents (*n*=119, 42%) agreed with the statement, "The eXtension technology is accessible to all Iowa State University Extension and Outreach clientele and potential clientele."

Table 21

Iowa Extension professionals' perceived accessibility of eXtension

Accessibility	Frequency	Percentage
Strongly Disagree	14	5
Disagree	36	13
Neither Agree Nor Disagree	92	32
Agree	119	42
Strongly Agree	25	9

Note. *n*=286; Median=4; 1=Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4=Agree, 5=Strongly Agree.

Capacity

Table 22 provides the sample size, median, frequencies and percentages for the capacity construct from the disruptive innovation theory. There were 143 (50%) respondents who agreed that eXtension was perceived to build the capacity of Iowa State University Extension and Outreach's educational outreach efforts.

Table 22

Iowa Extension professionals' perceptions of the disruptive innovation capacity construct

Capacity	Frequency	Percentage
Strongly Disagree	11	4
Disagree	16	6
Neither Agree Nor Disagree	90	32
Agree	143	50
Strongly Agree	25	9

Note. n=285; Median=4; 1=Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4=Agree, 5=Strongly Agree.

Responsiveness

Table 23 provides the sample size, median, frequencies and percentages for the responsive Disruptive Innovation construct. More than half of Iowa Extension professionals (*n*=153) neither agreed nor disagreed with the statement, "eXtension is responsive to the technological and information needs of Iowa State University Extension and Outreach clientele."

Table 23

Iowa Extension professionals' perceived responsiveness of eXtension

Responsiveness	Frequency	Percentage
Strongly Disagree	9	3
Disagree	20	7
Neither Agree Nor Disagree	153	54
Agree	89	31
Strongly Agree	15	5

Note. n=286; Median=3; 1=Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4=Agree, 5=Strongly Agree.

Customization

Table 24 provides the sample size, median, frequencies and percentages for the customization construct. The majority of respondents (n=184*)* indicated that they neither agreed nor disagreed that the eXtension technology could be customized by professionals and clientele.

Table 24

Iowa Extension professionals' perceived customization of eXtension

Customization	Frequency	Percentage
Strongly Disagree	6	2
Disagree	13	5
Neither Agree Nor Disagree	184	64
Agree	74	26
Strongly Agree	10	3

Note. n=287; Median=3; 1=Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4=Agree, 5=Strongly Agree.

Objective 5: Describe the correlation between Iowa State University Extension and Outreach professionals' selected background characteristics (age, gender, education, educational attainment, and years of employment in Cooperative Extension) and their perceptions of eXtension based on the Diffusion of Innovations Theory (Rogers, 2003) and the Disruptive Innovation Theory (Christensen, 1997).

Correlational statistics (Pearson product moment correlation (r) coefficient, point biserial correlation (r_{pb}), Cramer's V (φ_c), and Spearman rank order correlations (r_s) were used to measure the associations between Iowa State University Extension and Outreach professionals' selected background characteristics (age, gender, education, and years of employment in Extension) and their perceptions of eXtension based on the characteristics (a) relative advantage, (b) compatibility, (c) observability, (d) complexity and (e) trialability of the diffusion of innovations theory (Rogers, 2003) and characteristics of Christensen's (1997) disruptive innovation theory: (a) affordability, (b) accessibility, (c) capacity, (d) responsiveness, (e) customization.

Correlation coefficients were calculated between the perceived attributes of the study's diffusion of innovations and disruptive innovation theories and the background characteristics of participants (a) age, (b) gender, (c) educational attainment, and (d) years of employment in Cooperative Extension. For the diffusion of innovations' attributes, the Pearson product moment correlation (r) coefficient was used to calculate associations between Iowa Extension professionals' perceived attributes of the eXtension technology using the diffusion and disruptive innovation theories and the continuous interval data from participants' background characteristics, including age and years of employment in Cooperative Extension. A point biserial correlation (r_{pb}) was used to measure the relationships between the perceived diffusion of innovation attributes with the dichotomous variable of participants' gender. The Spearman rank order correlation (Spearman's rho) was calculated between the diffusion of innovations theory

attributes and the educational attainment variable due to both variables involving measurement on an ordinal ranked scale (Leedy and Ormrod, 2005). Spearman's rho was also used to calculate the correlation between the age, educational attainment, and years of employment in Cooperative Extension with the disruptive innovation attributes because each of the theory variables consisted of one Likert-type item. Cramer's V (φ_c) was used to measure the relationships between the perceived disruptive innovation attributes with the dichotomous variable of participants' gender.

Table 25 presents the Pearson product moment, point biserial and Spearman's rho rank order correlations between Iowa Extension professionals' perceived diffusion of innovation attributes and their personal characteristics. Of the 20 correlational coefficients shown in table 25, three (12%) were found to be significantly different from zero. The correlation coefficient between the perceived trialability of eXtension and Iowa Extension professionals' age was r = .19 ($p < .01$). The relationship between trialability and respondents' educational attainment was r_s = .12 ($p < .05$). Iowa Extension professionals' years of employment in Cooperative Extension was also found to have a statistically significant relationship with perceived the trialability of eXtension with a correlation coefficient of r = .16 ($p < .01$).

Table 25

Correlation between Iowa State University Extension professionals' perceived attributes of the diffusion of innovations theory and their select background characteristics

Perceived Attributes	Age [1]	Gender [2]	Educational [3] Attainment	Years of Employment [1] in Extension
Diffusion of Innovations				
Relative advantage	.02	-.11	-.08	-.04
Compatibility	.04	-.09	-.04	-.03
Complexity	-.03	-.09	-.02	-.03
Trialability	.19**	.02	.12*	.16**
Observability	.03	-.12	-.05	.02

Note. [1]Pearson r; [2] Point biserial coefficient (r_{pb}); [3]Spearman's Rho (r_s).
* $p < .05$. **$p < .01$.

Table 26 presents the Cramer's V and Spearman's rho rank order correlations between Iowa Extension professionals' perceived disruptive innovation attributes and their personal characteristics. None of the 20 correlational coefficients shown in table 26 were found to be significantly different from zero.

Table 26

Correlation between Iowa State University Extension professionals' perceived attributes of the disruptive innovation theory and their select background characteristics

Perceived Attributes	Age [1]	Gender [2]	Educational Attainment [1]	Years of Employment in Extension [1]
Disruptive Innovation				
Affordability	.02	.09	.00	.06
Accessibility	.04	.09	-.03	.00
Capacity	.05	.10	-.06	-.01
Responsiveness	.03	.07	-.07	-.03
Customization	.04	.05	-.07	-.03

Note. [1]Spearman's Rho (r_s). [2] Cramer's V. * $p < .05$. ** $p < .01$.

Objective 6: Determine whether Iowa State University Extension and Outreach professionals' perceptions of eXtension based upon Rogers's (2003) and Christensen's (1997) characteristics of an innovation predict the stage of adoption of Rogers's (2003) innovation-decision process.

A binary logistic regression was conducted to assess whether the effects of the perceptions of eXtension based upon the characteristics of Rogers's Diffusion of Innovations (2003) and Christensen's disruptive innovation (1997) (relative advantage, compatibility, complexity, trialability, observability, affordability, accessibility, capacity, responsiveness, and customization) predicted the stage of adoption in the innovation-decision process (Rogers, 2003; Li, 2004) at the awareness level (knowledge, persuasion) or adoption level (decision, implementation, confirmation).

The no knowledge stage in the innovation-decision process was removed from the statistical analysis since respondents' indicating "no knowledge" stage were not asked to complete questions regarding their perceptions of eXtension. Instead, they were directed to the end of the survey to provide only information about their background characteristics.

The six-stage ordinal dependent variable was dichotomized as two levels—those respondents who had awareness of eXtension (knowledge and persuasion stages) and those who have decided to use and adopt the technology in their work (decision, implementation and confirmation stages). The guideline for minimum number of cases per independent variable is 10 (Hosmer & Lemeshow, 2004). In this study there were 27 cases per independent variable.

A likelihood of adoption of eXtension at the higher adoption level was defined by a response of either "I have decided if I will use Extension," "I am using eXtension in my work," or "I have used eXtension long enough to evaluate if the online tool will be part of my future work in Extension." The lower awareness level of eXtension was defined as a response of either "I understand the purpose of eXtension, but have not decided if I like the technology" or "I am familiar with eXtension."

Table 27 presents the goodness-of-fit assessment for the Pearson chi-square and Hosmer-Lemeshow tests, which includes the chi-squares results, degrees of freedom and *p*-values for each of the binary logistic regression outcomes. The Pearson chi-square and the Hosmer-Lemeshow tests must be found to be non-significant at a *p*-value greater than .05 (Pallant, 2005). As shown in Table 27, the *p*-values for both the Pearson chi-square and the Hosmer-Lemeshow tests were found to be greater than the conventionally accepted significance level of .05. This indicates that the binary logistic regression model is a good fit with the data from the study.

Table 27

Goodness-of-Fit analysis for binary logistic regression

Goodness-of-Fit tests	x^2	*df*	*p*
Pearson x^2 test	265.85	253	.277
Hosmer-Lemeshow test	2.47	8	.963

Note. n=287; p >.05.

Table 28 displays the coefficients, standard error, z scores, and odds ratios for the binary logistic regression. The binary logistic regression model was found to be statistically significant with a *p*-value < 0.001 and likelihood ratio chi-square of 95.34. The pseudo R^2 = .27, indicating that the model accounted for 26.7% of the variance in the likelihood of Iowa Extension professional's to be at the higher level of adoption. The binary logistic regression model found the independent variables complexity (p<.01), trialability (p<.01) and customization (p<.05) to be statistically significant at a 95% confidence level. These results show that for every one unit increase (1=*Strongly Disagree,* 2=*Disagree,* 3=*Neither Agree nor Disagree,* 4=*Agree*, 5=*Strongly Agree*) in respondents' perceptions of complexity, the odds of an Iowa Extension professional indicating the higher adoption level increased by a factor of 2.5. For every one unit increase in Iowa Extension professionals' perceptions of trialability, the odds of the respondent indicating the higher level of adoption increased by a factor of 4.3. For every one unit increase in Iowa Extension professionals' perceptions of customization, respondents were .51 times less likely to select the higher level of adoption.

Table 28

Predictive ability of the diffusion of innovations and disruptive innovation characteristics on the innovation-decision process

Innovation-Decision Process	*b*	*SE*	*z*	*Odds Ratio*
Diffusion of Innovations				
Relative Advantage	.54	.51	1.07	1.72
Compatibility	.66	.47	1.39	1.93
Complexity	.93**	.34	2.74	2.53
Trialability	1.45**	.29	5.01	4.27
Observability	-.72	.40	-1.80	.49
Disruptive Innovation				
Affordability	-.32	.25	-1.25	.73
Accessibility	.07	.19	.34	1.07
Capacity	.24	.31	.76	1.27
Responsiveness	-.09	.31	-.29	.91
Customization	-.66*	.32	-2.09	.51

Note. n=272; b=regression coefficient; * $p < .05$. **$p < .01$.

Table 29 shows the predictive accuracy of the binary logistic regression model. Results show that there was 73.81% accuracy in predicting the higher level of adoption, 80.32% accuracy in predicting the lower level of adoption, and 78.31% accuracy overall. The model more accurately predicted membership in the lower awareness level stage of adoption. The overall correct classification rate was a 9.19% improvement over selecting the modal category.

The model was shown to have a high level of specificity, which indicated that 74% Iowa Extension professionals who were observed to be at the higher stage of adoption (n=62) were also predicted to be at the higher stage of adoption. The false positive rate revealed that 20% of the cases (n=37) that were observed to be at the lower stage of adoption stage were instead predicted to be at the higher adoption stage.

Table 29

Classification of Iowa Extension professionals by likelihood to attain the higher (adoption) or lower (awareness) stage of adoption of eXtension

Observed	Predicted			Percent Correct
	High	Low	Total	
High (Adoption Level)	*n*=62	*n*=22	84	73.81
Low (Awareness Level)	*n*=37	*n*=151	188	80.32
Overall Percentage				78.31[a]

Note. *n*=272. [a]A 9.19% improvement over selecting the modal category.

CHAPTER 5.

SUMMARY, DISCUSSION, THEORETICAL IMPLICATIONS, CONCLUSIONS AND RECOMMENDATIONS

The summary, discussion, theoretical implications, conclusions, and recommendations for future research are presented in this chapter. The chapter begins with a summary of the study, review of the purpose, research objectives and methodology.

Summary of the Study

Nearly a decade since the official launch of eXtension, the online resource has not been adopted and utilized by Extension professionals and clientele across the U.S. to the extent that eXtension founders envisioned it would (Harder and Lindner, 2008, Kelsey et al., 2011). Cooperative Extension is and will continue to be faced with the challenge of how to establish and maintain a competitive and sustainable online presence as increasingly online-bound audiences seek instant, credible information and resources via the Internet. A great deal of Cooperative Extension's financial, human and time resources have been and continue to be invested into eXtension. This has some state Extension systems questioning the financial sustainability and future of the technology (King and Boehlje, 2013). Six years since the official launch of eXtension, further research was needed to better understand the perceptions and acceptance of the eXtension technology among Cooperative Extension professionals.

Purpose and research objectives

The purpose of this study was to assess the perceptions of eXtension held by Iowa Extension professionals and their rate of adoption of the online resource using Rogers's (2003) diffusion of innovations theory and Christensen's (1997) disruptive innovation theory. This study sought to answer the following objectives.

1. Describe the background characteristics of Iowa State University Extension and Outreach professionals.
2. Describe Iowa State University Extension and Outreach professionals' current stage in the innovation-decision process of eXtension, based upon Li's adaptation of Rogers' (2003) stages in the innovation-decision process (no knowledge, knowledge, persuasion, decision, implementation, and confirmation).
3. Describe Iowa State University Extension and Outreach professionals' perceptions of eXtension based upon Rogers's (2003) characteristics of an innovation (relative advantage, compatibility, observability, complexity, and trialability).
4. Describe Iowa State University Extension and Outreach professionals' perceptions of eXtension based on Christensen's (1997) characteristics of a disruptive innovation (affordability, accessibility, capacity, responsiveness, and customization).
5. Describe the correlation between Iowa State University Extension and Outreach professionals' selected background characteristics (age, gender, education, educational attainment, and years of employment in Cooperative Extension) and their perceptions of eXtension based on the diffusion of innovations theory (Rogers, 2003) and the disruptive innovation theory (Christensen, 1997).
6. Determine whether Iowa State University Extension and Outreach professionals' perceptions of eXtension based upon Rogers's (2003) and Christensen's (1997) characteristics of an innovation predict the stage of adoption Rogers's (2003) innovation-decision process.

Research methodology

The target population for the census survey consisted of 975 Iowa State University Extension and Outreach faculty and staff as identified through the Iowa State University Extension and Outreach staff directory. The population for this study included Iowa Extension

professionals from each of the four educational program areas, including: agriculture and natural resources, community and economic development, human sciences, and 4-H youth development. The entire target population of Iowa Extension professionals was relevant and accessible for participation in this study. An online census was conducted to minimize sampling error.

The online questionnaire contained five sections examining (a) stage in the innovation-decision process (no knowledge, knowledge, persuasion, decision, implementation, and confirmation), (b) perceived diffusion of innovation characteristics of eXtension (relative advantage, compatibility, complexity, trialability, and observability), (c) perceived disruptive innovation characteristics of eXtension (affordability, accessibility, capacity, responsiveness, customization), (e) background characteristics of respondents (age, gender, years of employment in Cooperative Extension, employment location, educational attainment), and (e) open-ended questions regarding their perceptions of eXtension.

All Iowa State University Extension and Outreach professionals (N=975) were available for participation in the study. A pilot study with a randomized subsample of the population (n=30) was conducted to evaluate the proposed questionnaire and study implementation procedures (Dillman et al., 2009). A total of 17 Iowa State University Extension and Outreach professionals completed the questionnaire for a total response rate of 59% (n=17). The final survey was distributed to the remaining members of the target population (n=945) in July 2014. A final response rate of 44% (n=429) was obtained, which included the respondents from the pilot study. The survey in both the pilot and formal studies was disseminated and data was collected using the Tailored Design Method (Dillman et al., 2009).

The Qualtrics® survey software collected the data produced by the questionnaire. Descriptive and inferential statistics were generated using the Stata®/IC 12 statistical software

program. The predictor variables in the study were: (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, (e) observability, (f) affordability, (g) accessibility, (h) capacity, (i) responsiveness, (j) customization, (k) age, (l) years employed in Cooperative Extension, (m) educational attainment, (n) educational area employed within Extension, (o) location of Extension employment, and (p) gender. The criterion variable was stage (Rogers, 2003) in the innovation-decision process, which comprised of two binary levels: awareness (knowledge and persuasion stages) and adoption (decision, implementation, and confirmation).

Findings

Results of the study show that the highest number of respondents reported that they were familiar with eXtension-the third stage of adoption—persuasion (n=139, 32.63%). A quarter of the respondents remain at the no knowledge stage of eXtension (n=109, 25.59%), 16% (n=68) of respondents were at the knowledge stage, less than 1% (n=3) were at the decision stage, 15% (n=65) were at the implementation stage, and 10% (n=42) were at the highest stage—confirmation. Iowa Extension professionals perceived eXtension to exhibit the attributes of relative advantage, accessibility and capacity. Yet, respondents neither agreed nor disagreed that eXtension was perceived as exhibiting compatibility, complexity, observability, trialability, affordability, responsiveness, and customization attributes.

Statistically significant relationships were reported between Iowa Extension professionals' age, educational attainment, and years of employment in Cooperative Extension and their perceptions of eXtension's trialability—the degree to which the technology can be experimented with on a trial basis (Rogers, 2003).

A logistic regression analysis explained 26% of the variability in membership at one of two levels of adoption—the higher level of adoption or lower level of awareness. For every one unit increase (1=*Strongly Disagree,* 2=*Disagree,* 3=*Neither Agree nor Disagree,* 4=*Agree*, 5=*Strongly Agree*) in respondents' perceptions of complexity and trialability, the odds of an Iowa Extension professional indicating the higher adoption level increased by a factor of 2.5 and 4.3, respectively. For every one unit increase in Iowa Extension professionals' perceptions of customization, respondents were .51 times less likely to select the higher level of adoption.

Discussion

The main objectives of this study were to identify Iowa State University Extension and Outreach professionals' current stage in Rogers's (2003) innovation-decision process and determine their perceptions of eXtension using the diffusion of innovations theory and disruptive innovation theory to guide the research. The study also determined whether a relationship existed among respondents' background characteristics (age, gender, educational attainment, and years of employment in Cooperative Extension) and their perceived characteristics of eXtension (relative advantage, compatibility, complexity, trialability, observability, affordability, accessibility, capacity, responsiveness, and customization). Finally, the study also sought to determine whether Iowa Extension professionals' perceptions of eXtension predicted their stage of adoption of eXtension using Rogers's (2003) innovation-decision process.

Stage of adoption in eXtension

Results of the study show that the highest number of Iowa Extension professionals reported being at the persuasion stage (level 3 of six) of adoption (*n*=139, 32.63%), indicating

that they are familiar with eXtension. However, one quarter of Iowa Extension professionals (*n*=109, 25.59%) remain at the no knowledge stage of adoption, reporting that they never heard of eXtension prior to this study. 16% of respondents (*n*=68) shared being at the knowledge stage, less than 1% (*n*=3) remain at the decision stage, 15% (*n*=65) at the implementation stage and less than 10% (*n*=42) at the highest level—the confirmation stage of innovation-decision process.

These results reveal that nearly three-quarters of the respondents (74.3%) are in the bottom three stages of the adapted (Li, 2004) innovation-decision process—no knowledge, knowledge, and persuasion stages. There were 15% of respondents (*n*=65) who indicated that they are using eXtension in their work and less than 10% of respondents (*n*=42) who have used eXtension long enough to determine whether or not it would be a part of their future work in Extension. Six years since the official launch of eXtension, 25% of Iowa Extension professionals do not know about eXtension, while the remaining respondents have chosen to further their adoption or rejection the technology in their work. Only 25% of respondents (those at the implementation and confirmation stages) indicated that they are using eXtension.

When the eXtension technology was established in 2008, founders envisioned that Extension professionals would adopt the new technology at a rate of 75% within the first year (Harder and Lindner, 2008). As shown in the results of this study, eXtension continues to be far from gaining widespread adoption from Extension professionals in the state of Iowa considering that 25% of the surveyed Iowa Extension professionals remain at the no knowledge stage (*n*=109).

Given the low rates of adoption among state Extension systems throughout the U.S., it can be questioned whether eXtension had quickly created an online presence for Cooperative

Extension. Even though a needs assessment was conducted prior to the official launch of eXtension among Cooperative Extension professionals to determine if the national initiative was desired by all state Extension systems (D. Cotton, personal communication, December 18, 2014), there appears to still have been a lack of input from state Extension systems in the development of the technology. This caused eXtension to never achieve full adoption following the official launch in 2008 because an innovation was created that did not fully take into consideration the technology and information needs of Cooperative Extension professionals and their clientele. Based on the lack of adoption among Iowa's Extension professionals, it is evident that the eXtension technology has not lived up to its aspirations.

While these results could indicate that Iowa Extension professionals are considered to be late majority or laggard adopters of the technology, only one quarter of the respondents actually had no knowledge of eXtension. This indicates that three-fourths of Iowa's Extension professionals had already made a decision to adopt or reject the technology. Those respondents who shared that they were using the technology in their work (25%) revealed that the remaining 50% of the population were aware of eXtension and choosing not to further adopt the technology in their work. These findings show that Iowa Extension professionals have been active critics and intentional abstainers of eXtension as the majority of Iowa's Extension professionals have made a conscious decision to reject eXtension in their work for one reason or another.

One reason could be the result of each state Extension system—both large and small—having equal access to resources, information and support from eXtension. This has some larger state Extension systems questioning why they should support and serve a national initiative when they can provide equal if not better resources to professionals and clientele within their own states (C. Kress, personal communication, November 24, 2014). It's evident that some larger

state Extension systems are less likely to promote and encourage professionals to use eXtension when there are just as competitive technologies and resources being used locally.

Results of the current investigation align with a study conducted in 2007 prior to the official launch of eXtension (the first public eXtension resources became available by some Communities of Practice in 2006) that assessed Texas Cooperative Extension agents' adoption of eXtension and found 31% of respondents to be at the no knowledge stage (Harder). In a 2010 study of eXtension's adoption among Oklahoma Extension employees, 80% of its respondents (n=133) reported knowledge of the technology, but half of the respondents were shown to have never used eXtension (Kelsey, Stafne, Greer, 2011). Results of the current study also reaffirm previous research that Cooperative Extension professionals from multiple state Extension systems are aware of the technology but have chosen not to use nor adopt the technology.

There were 25% of participants who reported being in one of the top three stages (decision n=3, implementation n=65, and confirmation n=42) of the innovation-decision process, which shows that there are Iowa Extension professionals using eXtension in their work. This group of participants can be defined as both early adopters and the early majority. Early adopters are the first to adopt an innovation, providing support and insight to members of a social system about the use of the innovation. The early majority is then next to adopt the innovation just before the rest of the members of the group (Rogers, 2003). Respondents of the open-ended questions and members of the early adopter and early majority categories shared that they were using eXtension to enhance their own professional development and skill growth as well as to provide greater research-based information to clientele, "customers care that they get quality, accurate information. Extension has that reputation. Our nationwide Extension brand is strengthened when we work together with other states" (Iowa Extension professional, 2014).

As indicated previously, the highest number of respondents (*n*=139, 32.63%) selected the persuasion stage as their current stage in their adoption of eXtension. These findings show that Iowa Extension professionals have moved beyond the knowledge stage and have begun to form more favorable or unfavorable perceptions of the technology. At this stage of adoption, the diffusion of innovations theory recognizes that individuals have become much more psychologically involved in the innovation. Additionally, Rogers (2003) believed that an innovation's perceived relative advantage, compatibility, complexity, trialability, and observability becomes increasingly important at the persuasion stage. Iowa Extension professionals reported neutral perceptions of these three constructs, which may explain why eXtension has not advanced in stages of adoption by professionals in Iowa State University Extension and Outreach.

Perceptions of eXtension: diffusion of innovations

Results of the study show that Iowa Extension professionals perceived eXtension to have relative advantage attributes. Respondents tended to neither agree nor disagree that eXtension exhibited compatibility, complexity, observability, and trialability attributes.

The perceived relative advantage and compatibility of a technology are shown to be two of the most influential variables in determining an innovation's rate of adoption (Rogers, 2003). In addition, when an innovation is perceived as having a high level of relative of advantage, compatibility, trialability and observability by members of a social system, the innovation is more likely to have an increased rate of adoption (Rogers, 2003). Given that relative advantage was the only attribute perceived at a high degree among Iowa's Extension professionals, the neutral perceptions of the eXtension technology may have attributed to the overall lack of

adoption. These findings of eXtension's perceived relative advantage are similar to those among Oklahoma Extension professionals who did not perceive the technology to have a high degree relative advantage (Xu & Kelsey, 2011).

In a study among Texas Cooperative Extension agents, Harder and Linder (2008) concluded that as eXtension becomes increasingly integrated within Extension professionals' daily activities, the compatibility of the new innovation will increase. Given the neutral findings of respondents' perceived compatibility, the eXtension technology is still shown to conflict with the values and norms of Iowa Extension professionals' work and organizational culture as a result of the technology's lack of awareness and adoption.

The complexity of an innovation can be perceived as a very important barrier in an individual's willingness to adopt an innovation (Rogers, 2003). The neutral perceptions of complexity among Iowa Extension professionals are comparable to the results of a study of Texas Extension agents' who also did not perceive eXtension to be a complex technology (Harder, 2007). Therefore, respondents who reported a more favorable perception of complexity (this variable actually measured simplicity of eXtension, the opposite of complexity) were more likely to attain a higher adoption stage of eXtension. The neutral perceptions of the eXtension's perceived complexity construct align with other current research within Cooperative Extension, which illustrates that professionals who are finding online learning technologies somewhat easy to use are somewhat likely to adopt them in their work (Dromgoole & Boleman, 2006).

Respondents were also found to have neutral perceptions of eXtension but at a lower degree for the observability (M=2.60, SD=.74) and trialability (M=2.76, SD=.79) attributes as professionals neither agreed nor disagreed that they were characteristics present in the eXtension technology. This data shows that the attributes of eXtension were not perceived at the level

needed to further influence an individual's decision to adopt the technology. Texas and Oklahoma Extension professionals were found to perceive eXtension to have a low degree of observability given that the website had not been well publicized and respondents did not agree that the advantage of using eXtension could be easily demonstrated to the public (Harder, 2007; Xu & Kelsey, 2011).

Perceptions of eXtension: disruptive innovation

A disruptive innovation's perceived affordability, accessibility, capacity, responsiveness, simplicity, or customization of a process or product (Franz & Cox, 2012; Christensen, Anthony, & Roth, 2004; Christensen, 1997) are key variables which, when present in an innovation, have been shown to disrupt new and low-end markets and become a disruptive innovation. Iowa Extension professionals (n=287) were shown to have favorable perceptions of eXtension's perceptive accessibility and capacity attributes, while the affordability, responsiveness and customization attributes were neutrally perceived.

Results of the study show that eXtension was positively perceived by Iowa Extension professionals as being accessible to all Iowa State University Extension and Outreach clientele and non-clientele. These results align with other technology adoption studies conducted among Cooperative Extension professionals which indicated that they are somewhat interested in obtaining educational resources at a distance due to the ease of accessibility (Senyurekli et al., 2006, Yaghoubi, 2009). In addition, Iowa Extension professionals' more favorable perceptions of eXtension's capacity construct may be attributed to respondents' perceiving eXtension to aid in finding a balance between serving traditional clientele face-to-face while trying to increase the online presence of Cooperative Extension. (Dromgoole & Boleman, 2006).

A disruptive innovation is an innovation that creates a new market and value network, and eventually disrupts an existing market and value network, displacing an earlier technology (Christensen, 1997). To a small degree, eXtension has been a disruptive innovation for Cooperative Extension. The technology provides new value to the organization and its clientele by providing research-based information that is accessible and builds the capacity of the organization and its educational outreach from the perspective of Iowa's Extension professionals.

Yet, eXtension is still not perceived to exhibit the qualities, to the degree necessary, to become a disruptive innovation for Iowa State University Extension and Outreach. This failure may be the result of barriers to disruptive innovation as identified by Assink (2006). These organizational barriers to disruptive innovation include creating a risk-averse culture that is not structured to embrace disruptive innovation, recognize market trends, nurture innovation, or meet the evolving needs of clientele.

Further research is needed to assess whether eXtension has the potential to be positively perceived as an affordable, responsive and customizable technology, or if other markets must be addressed or new ones created within the organization for eXtension to become a full disruptive innovation for Cooperative Extension. Additional focus on creating new market disruptions by reaching what Christensen (1997) calls "non-consumers" —those currently not using eXtension—will also increase the technology's likeliness of becoming a disruptive innovation. Considering that 25% of Iowa Extension professionals remain at the no knowledge stage of eXtension, there is a prime opportunity within the state to influence non-consumers about the value of using eXtension in order to create a new market disruption.

Relationship between respondent characteristics and perceptions of eXtension

The results show that there was a statistically significant, but low association (.10-.29) (Davis, 1971) present among Iowa Extension professionals' age, educational attainment and years of employment in Extension and the perceived trialability, affordability, accessibility and capacity of the eXtension technology. Statistically significant correlations were present between Iowa Extension professionals' perceived trialability of eXtension and their age ($r = .19$, $p < .01$), educational attainment ($r_s = .12$, $p < .05$), and years of employment in Cooperative Extension ($r = .16$, $p < .01$). The strongest correlation was present among Iowa Extension professionals' perceived trialability of extension and the age of respondents. Findings revealed that as respondents' age increased so did their more positive perception of eXtension's trialability. These findings contradict with Rogers's (2003) diffusion of innovations theory and previous research (Xu & Kelsey, 2011), which reported that age is instead considered to be negatively associated with the rate of adoption. These results also indicate that older respondents were more likely to have tried eXtension and its resources on an experimental basis. Although age is considered to be negatively associated with the rate of adoption (Rogers, 2003), these results show that older respondents were more likely to have tried eXtension and its resources and tools on an experimental basis in their work.

Respondents' educational attainment and years of employment in Cooperative Extension were also found to have a statistically significant relationship with their perceived trialability of eXtension. Results showed that as respondents' educational attainment and number of years of employment increased so did their perceived trialability of eXtension. These results show that Iowa Extension professionals' who had more years of education and experience working in Cooperative Extension were more likely to have tried using eXtension in their work. Educational

attainment is considered to be a predictor in influencing an individual's decision to adopt an innovation (Rogers, 2003). Study participants who can be defined as early adopters (those at the implementation and confirmation stages) of an innovation are more likely to have attained a higher level of education than their late adopter counterparts.

Innovations that can be tried by potential users on an experimental basis are more likely to be adopted more quickly than innovations that cannot be experimented with by potential adopters (Rogers, 2003). Iowa Extension professionals who are older, more experienced and have attained higher levels of education may have had more opportunities to experiment with the resources and tools available within eXtension than younger, less experienced professionals with fewer years of higher education before deciding whether or not to adopt the technology as well.

Perceptions of eXtension in predicting stage of adoption

Iowa Extension professionals' perceived complexity, trialability and customization attributes were shown to be statistically significant in predicting respondents' stage of adoption of eXtension. These results show that for every one unit increase (1=*Strongly Disagree,* 2=*Disagree,* 3=*Neither Agree nor Disagree,* 4=*Agree*, 5=*Strongly Agree*) in respondents' perceptions of complexity and trialability, the odds of an Iowa Extension professional indicating the higher adoption level versus the lower awareness level increased by a factor of 2.5 and 4.3, respectively. For every one unit increase in Iowa Extension professionals' perceptions of customization, respondents were .51 times less likely to select the higher level of adoption.

The complexity of an innovation can be perceived as an important barrier in an individual's willingness to adopt an innovation (Rogers, 2003). These results are comparable to the assessment of Texas Extension agents' who also did not perceive eXtension to be a complex

technology (Harder, 2007). Therefore, respondents who reported a more favorable perception of complexity (this variable actually measured simplicity of eXtension, the opposite of complexity) were more likely to attain a higher adoption stage of eXtension. The favorable perceptions of the eXtension's perceived complexity construct align with other current research within Cooperative Extension, which illustrates that professionals who are finding online learning technologies easy to use are more likely to adopt them in their work (Dromgoole & Boleman, 2006).

Trialability was found to be positively related to the odds of an Iowa Extension professional selecting the higher level of adoption as well. The trialability construct's positive association with the increased rate of adoption aligns with Rogers's (2003) diffusion of innovations theory which suggests that innovations that can be experimented with on a trial basis are generally adopted faster than those that cannot be tried as easily. This indicated that Iowa Extension professionals felt that they were able use eXtension on a trial basis to determine if the technology worked for them, which then led respondents to be more likely to report a higher stage in the innovation-decision process.

These results revealed that as Iowa's Extension professionals' had the opportunity to experiment with eXtension and its tools in their work on a trial basis, respondents were more likely to attain a higher stage of adoption in the innovation-decision process. Harder (2007) found similar results in her assessment of Texas Extension Agents who found eXtension to exhibit characteristics of trialability. Yet, the opposite was found among Oklahoma Extension professionals who were not satisfied with eXtension's perceived trialability (Xu & Kelsey, 2011). Further research on other state Extension systems is needed to determine the likeliness of eXtension's trialability attribute in predicting a higher stage of adoption.

Respondents' perceived customization was also shown to have a statistically significant negative association with respondents' stage of adoption. Iowa Extension professionals who positively perceived eXtension's customization were about .51 times less likely to select the higher adoption level of eXtension. Although the customization of the disruptive innovation theory is considered a positive attribute, these results show that respondents were more likely to select the lower stage of adoption. This lower stage could be the result of Iowa Extension professionals recognizing that increased customization would result in a loss of continuity and possibly quality of service when services become specific to each individual user of eXtenison. Providing customization of an innovation can also result in an increase in cost to maintain the service (Ahlstrom & Westbrook, 1999). Given respondents' neutral perceptions of the perceived affordability of eXtension, it is possible that Iowa Extension professionals perceived customization as an asset of the technology but did not at the level necessary to select a higher stage of adoption in the innovation-decision process.

Theoretical Implications

The diffusion of innovations and disruptive innovation theories which guided the study were effective in assessing the perceptions and perceived value of eXtension as well as Iowa Extension professionals' stage of adoption of in the innovation-decision process. Based on previous eXtension research (Harder, 2007), Li's (2004) no knowledge stage was also incorporated in this study. The addition of the no knowledge stage proved beneficial given that 25% of Iowa Extension professionals indicated not having any knowledge of the online resource prior to the study.

Yet, the decision stage in the innovation-decision process was selected by only three of the total study participants (*n*=429, .01%). This small population of respondents was due to either a poorly written decision stage statement or respondents having already made a decision to either further their adoption of the technology, discontinue using the technology, reject the technology, or chose to adopt the technology at a later time (as shown in Figure 1.). Rogers (2003) indicated that the innovation process can move quite slowly or quickly. Individuals at the decision stage are evaluating their perceptions of the innovation and determining whether or not to further their adoption of the technology. Therefore, it is possible that Iowa Extension professionals quickly made a decision to further adopt or reject eXtension, which may have resulted in respondents advancing to the implementation or confirmation stages, or even backtracking to the persuasion or knowledge stages.

Given that 25% of the population was either not aware of eXtension (no knowledge—*n*=109, 25.59%) and that nearly half of the respondents had not advanced past the knowledge (*n*=68, 16%) or persuasion stages (*n*=139, 32.63%), it is evident that many Iowa Extension professionals had not even arrived at the decision stage to determine whether to adopt or reject the technology. However, of the Iowa Extension professionals who were aware of the technology (75%), only 15% were using the technology in their work. This revealed that the remaining 50% of the population made a decision to not adopt eXtension even prior to arriving at the decision stage.

Although Rogers indicated in the *Diffusion of Innovations* that, "each stage in the innovation-decision process is a potential reject point" (2003, p. 177), the innovation-decision process model does not take into account that an innovation can be both adopted or rejected at any point in the five stages of adoption. Even at the confirmation stage an individual within a

social system can still choose to reject an innovation. Hence, the decision to adopt or reject an innovation can occur at any point beyond the no knowledge stage.

In addition, perceptions of an innovation (relative advantage, compatibility, complexity, observability, and trialability) can be formed at any of the five stages of adoption and not only at the persuasion stage. Therefore, it is recommended that the decision stage as well as the perceptions of an innovation be implemented as part of each of the five innovation-decision process stages.

The prior conditions (previous practice, felt needs/problems, innovativeness, and norms of the social system) and characteristics of the decision-making unit (socioeconomic characteristics, personality variables, communication behavior) are taken into account and evaluated as part of an individual or social systems' perceptions of the characteristics of an innovation. In an effort to develop a more parsimonious model the prior conditions and decision-making unit characteristics were not treated as separate components in the adaptation of the model.

Figure 3 proposes an adaptation to Rogers's innovation-decision process model that eliminates the prior conditions and decision-making unit characteristics, and accounts for the implementation of the decision as well as the formation of perceptions of the innovation at each of the five stages in the innovation-decision process.

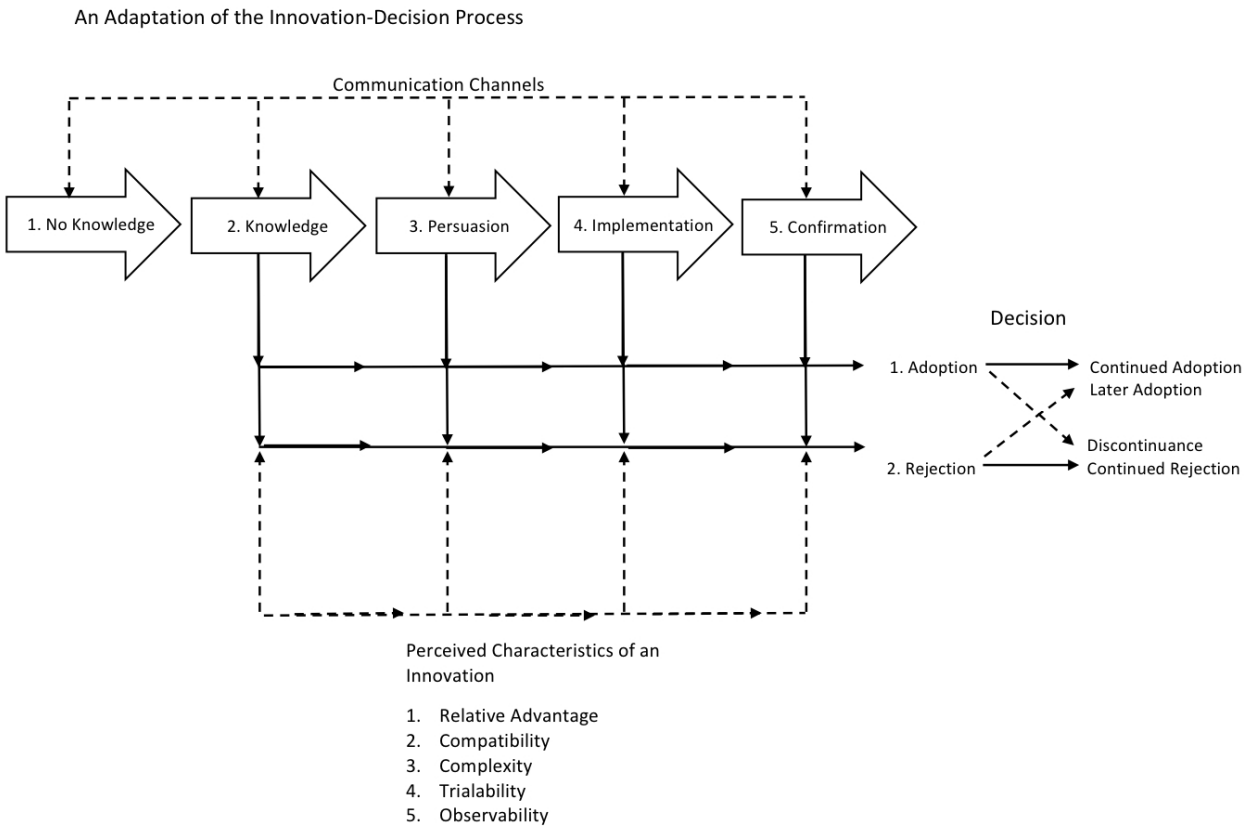

Figure 3. An adaptation of the innovation-decision process, Adapted from "Diffusion of Innovations" (p.170), by E. M. Rogers, 2003, New York, NY: The Free Press, a Division of Simon & Schuster, Inc. Copyright 1995, 2003 by Everett M. Rogers. Adapted with Permission.

Both the diffusion of innovations and disruptive innovation theories were effective in guiding the study's research objectives and assessing the perceptions of the innovation attributes of eXtension. The diffusion of innovations theory was used to determine at what rate the eXtension technology is adopted within Iowa State University Extension and Outreach based on the innovation attributes and stages in the innovation-decision process. In addition, the disruptive innovation theory was used to identify which theory attributes were present in the eXtension technology and which ones were not. This research laid the groundwork for determining whether eXtension had the qualities needed to create new value and cause a disruptive innovation for Cooperative Extension. Although the disruptive innovation theory was designed to assess how

disruptive innovation can be created and nurtured in large and small businesses, the theory has significant application within Cooperative Extension given the organization's complexity and longevity.

The two theories were found to be more similar than different when implemented in the study. The diffusion of innovations' complexity construct and disruptive innovation's simplicity construct were both designed to assess the innovation's perceived ease of use. Due to the similarity of the two attributes, only the complexity construct from the diffusion of innovations theory was used in the study to assess the ease of use of the eXtension technology. The diffusion of innovations and disruptive innovation theories complimented the study and were effective in identifying the perceptions and stage of adoption of eXtension among Iowa Extension professionals. The two theories are compatible and should continue to be used together in future technology adoption research.

Conclusions

The purpose of this study was to assess the perceptions of eXtension held by Iowa Extension professionals and rate of adoption of the technology using Rogers's (2003) diffusion of innovations and Christensen's (1997) disruptive innovation theories. This study has implications for Cooperative Extension and the eXtension online resource. Findings from this study can be used to further the understanding of Extension professionals' perceptions and stage of adoption of eXtension as well as factors that influence professionals' likeliness to adopt the online resource. The following conclusions were drawn from the study:

1. The average age of the Iowa Extension professional, who participated in the study, was 46 years. The majority of participants were female and held either a bachelor's or master's degree. The highest number of respondents were employed in the Agricultural and Natural Resources educational area and had been employed with Cooperative Extension for ten years.
2. eXtension has not been adopted by Iowa State University Extension and Outreach professionals as founders intended it would when the technology was launched in 2008.
3. One quarter of Iowa Extension professionals, who responded to the survey, had no knowledge of eXtension. Only a small portion of the population indicated using eXtension in their work.
4. The majority of Iowa Extension professionals participating in the study had already made a decision concerning whether or not they would use or not use eXtension in their work.
5. Iowa Extension professionals' perceived eXtension to exhibit the characteristics of relative advantage, accessibility, and capacity.
6. Iowa Extension professionals neutrally perceived eXtension to be a compatible, complex, observable, experimental, affordable, responsive, and customizable technology.
7. eXtension has the potential to become a disruptive innovation based on Iowa Extension professionals' favorable perceptions of the accessibility and capacity attributes.
8. As respondents' age, educational attainment and years of employment in Cooperative Extension increased, their perceptions of eXtension's ability to be experimented with on a trial basis (trialability) became more favorable.

9. The complexity, trialability, and customization attributes had a statistically significant influence on predicting the likeliness of attaining the higher level of adoption of eXtension.
10. The complexity, trialability, and customization attributes, although statistically significant, explained only a small portion of the variance in predicting the level of adoption in the innovation-decision process. The majority of the variance in the predicted level of adoption was due to other factors not accounted for in this study.

Recommendations for Practice:

Several recommendations for practice were made based on the findings of the study:

1. Iowa State University Extension and Outreach should enhance the promotion of the no-cost resources and tools available in eXtension to all Iowa Extension professionals at all stages of the innovation-decision process through professional development opportunities, trainings, webinars and staff newsletters to increase use of the technology.
2. Iowa State University Extension and Outreach needs to determine how eXtension can exhibit the perceived attributes of affordability, accessibility, customization, and responsiveness in order for the technology to become a disruptive innovation and ultimately a sustaining online resource for Cooperative Extension.
3. Iowa State University Extension and Outreach should increase professional development opportunities, trainings and webinars for professionals and clientele that showcase information about the affordability, accessibility, responsiveness, customization, and trialability attributes of eXtension.

4. Iowa State University Extension and Outreach should provide ongoing professional development to support those respondents who have attained the implementation or confirmation stage in the innovation-decision process.

Recommendations for Future Research

1. Further quantitative research is recommended to examine the perceptions and adoption of eXtension among clientele of Cooperative Extension.
2. Further qualitative research is recommended to examine the organizational culture of Iowa State University Extension and Outreach and its influence on professionals' perceptions and stage of adoption of eXtension.
3. Further research is recommended to assess the perceptions and rate of adoption of other online learning technologies among Iowa Extension professionals.
4. Results of the study show that a significant number of Iowa Extension professionals remain at the no knowledge and persuasion stages in the innovation decision process. Further qualitative research is needed to understand Iowa Extension professionals' lack of awareness of eXtension and determine why many Iowa Extension professionals have not advanced past the decision stage of adoption.
5. Additional quantitative research is recommended to more closely examine the influence of other background characteristics on the perceptions and adoption of eXtension. Characteristics should include county versus state-employment in Extension, socioeconomic status (i.e., personal income and possession of wealth) of Iowa Extension professionals and the counties in which they serve (i.e., size, wealth, and proximity to urban areas).

6. A limitation of the study was that only professionals employed in Iowa State University Extension and Outreach were administered the survey. It is recommended that similar research be conducted in other state Extension systems across the U.S to further understand the use, perceptions and adoptions of eXtension among Cooperative Extension professionals.
7. Further technology adoption research using Rogers's diffusion of innovations theory should use the adapted innovation-decision process model that implements the decision into each of the innovation-decision process stages and acknowledges that the perceptions of an innovation (relative advantage, compatibility, complexity, trialability, and observability) can be formed at any of the five stages of adoption.
8. Further research that assesses the perceptions and adoption of innovations using the disruptive innovation theory is recommended in Cooperative Extension and higher education environments.

APPENDIX A. SURVEY INSTRUMENT

The purpose of this study is to gain a greater understanding of the perceptions, acceptance and value of eXtension – America's Research-based Learning Network™ – among Iowa State University Extension and Outreach faculty and staff.

Directions:

The questionnaire contains seven short sections and should take approximately twenty minutes to complete. Please read the instructions for each section carefully before answering the questions.

If for any reason you need to leave the survey, your responses will be saved. You can re-enter the survey by clicking on the survey link that was initially emailed to you.

We want to assure you that your survey responses will be completely anonymous. No personally identifiable information will be captured unless you voluntarily of fer personal or contact information in the comment field. Additionally, your responses will be combined with those of many others and summarized in a report to further protect your anonymity.

Thank you for your participation in this study.

eXtension Survey

Part 1:

The information-based website called eXtension www.extension.org is an interactive online network providing access to research-based information from Cooperative Extension professionals across the United States.

1.) Please indicate your use of eXtension:

- ○ I have never heard of eXtension prior to this study .
- ○ I understand the purpose of eXtension, but have not decided if I like the online technology .
- ○ I am familiar with eXtension.
- ○ I have decided if I will use eXtension.
- ○ I am using eXension in my work.
- ○ I have used eXtension long enough to evaluate if the online tool will be part of my future work in Ext ension.

Part 2:

The following statements describe characteristics of the eXtension technology .

Please indicate your level of agreement with the following statements:

2.) eXtension enhances the quality of work I do.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

3.) eXtension is a useful tool in delivering educational outreach to clientele.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

4.) eXtension increases accessibility to research-based information.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

5.) eXtension can enable Extension professionals to be more effective in their roles.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

Please indicate your level of agreement with the following statements:

6.) eXtension supports my work.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

7.) eXtension supports the mission of Cooperative Extension.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

8.) eXtension helps me deliver programs based on the needs of clientele.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

9.) My vision for the future of Cooperative Extension includes eXtension.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

Please indicate your level of agreement with the following statements:

10.) Using eXtension is easy for me.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

11.) eXtension is user-friendly.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

12.) I can find the information I am looking for using eXtension.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

13.) Using online resources to access information is easy for me.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

Please indicate your level of agreement with the following statements:

14.) I have used the eXtension website.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

15.) I am able to experiment with eXtension.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

16.) I have used the Ask an Expert eXtension tool:

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

17.) I have used the online courses eXtension tool:

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

18.) I have used the Communities of Practice eXtension tool:

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

19.) I have used the Communities of Interest eXtension tool:

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

20.) I have used professional development resources in eXtension:

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

Please indicate your level of agreement with the following statements:

21.) I have seen how other Extension professionals use eXtension in their work.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

22.) The official eXtension website is well-publicized.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

23.) eXtension is a highly visible resource for Extension professionals and clientele.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

Part 3:

Please indicate your level of agreement with the following statements:

24.) eXtension helps Iowa State University Extension and Outreach become more innovative.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

25.) eXtension helps Iowa State University Extension and Outreach reach a more diverse customer base.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

26.) eXtension broadens Iowa State University Extension and Outreach's educational outreach to potential clientele not currently utilizing Extension resources.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

27.) eXtension helps Iowa State University Extension and Outreach disseminate land-grant university knowledge to clientele.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

28.) eXtension is an affordable online technology for Iowa State University Extension and Outreach.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

29.) The eXtension technology is accessible to all Iowa State University Extension and Outreach clientele and potential clientele.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

30.) The eXtension technology builds the capacity of Iowa State University Extension and Outreach's educational outreach.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

31.) eXtension is responsive to the technological and information needs of Iowa State University Extension and Outreach clientele.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

32.) eXtension can be customized to best meet the needs of Iowa State University Extension and Outreach.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
○	○	○	○	○

Part 4:

33.) Where is your place of work located?

34.) My primary work is in the following Extension educational area:

- ○ 4-H Youth Development
- ○ Human Sciences
- ○ Agriculture and Natural Resources
- ○ Community and Economic Development
- ○ Other

35.) What is the highest level of education you have completed?

- ○ High school degree or equivalent (e.g., GED)
- ○ Some college but no degree
- ○ Associate degree
- ○ Bachelor's degree
- ○ Master's degree
- ○ Ph.D.

36.) How many years have you worked for Extension?

37.) What is your current age?

Part 5:

38.) Why have you chosen to use, or not use, eXtension in your work with Iowa State University Extension and Outreach?

39.) Iowa State University Extension and Outreach spends approximately $80,000 to support eXtension each year. Do you feel the money spent is a good investment for the organization and its clientele?

40.) What do you believe is the future role of eXtension within Iowa State University Extension and Outreach?

41.) In the space below, please include any further comments you wish to share regarding this survey or eXtension – America's Research-based Learning Network™

Thank you for your time and cooperation.

Cayla Taylor
Ph.D. Candidate
Agricultural Education and Studies
Iowa State University
cayla@iastate.edu
515-802-7484

APPENDIX B. PARTICIPANT COMMUNICATION

Email Contact #1:

July 31, 2014

Dear Iowa State University Extension and Outreach Faculty and Staff:

I am writing to request your help with an important study that is being conducted to better understand the perceptions, acceptance and value of the online learning resource called eXtension. You are receiving this request to participate in this research study because you are a professional within Iowa State University Extension and Outreach. In the next few days you will receive additional information regarding this research study in addition to access to complete an online questionnaire, which will include questions regarding your perceptions and use of eXtension.

Your responses to this survey are very important, and will help in advancing the development of successful technology-based learning to enhance the quality of communications, education, and access to research-based information through Iowa State University Extension and Outreach. This research only can be successful with the participation of Iowa State University Extension and Outreach professionals like you.

I hope that you will set aside twenty minutes of your time over the next few weeks to participate in this research project. Most of all, I hope that you enjoy the opportunity to voice your thoughts and opinions about eXtension. Should you have questions regarding the project, please contact the study coordinator: Cayla Taylor, cayla@iastate.edu, (515)-802-7484, Ph.D. Candidate in the Agricultural Education and Studies Department at Iowa State University.

Sincerely,

Lyn Brodersen
Assistant Vice President, Organizational Development
Iowa State University Extension and Outreach
1118 Extension-4H Building
Ames, IA 50011
lbro@iastate.edu
515.294.1517

Email Contact #2:

August 5, 2014

Dear Iowa State University Extension and Outreach Professionals,

I am writing to ask for your participation in a survey that assesses the perceptions, acceptance and value of eXtension – America's Research-based Learning Network™. We are asking faculty and staff like you, in Iowa State University Extension and Outreach, to share your experiences using the eXtension technology in your work.

Your responses to this survey are very important and will help in advancing the development of successful technology-based learning to enhance the quality of communications, education and access to research-based information through Iowa State University Extension and Outreach.

This is a survey and should take you no more than twenty minutes to complete. Please click on the link below to go to the survey website.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Your participation in this survey is entirely voluntary and all of your responses will be kept confidential. No personally identifiable information will be associated with your responses in any reports of this data. Should you have any further questions or comments, please feel free to contact me at cayla@iastate.edu or 515-802-7484.

I appreciate your time and consideration in completing this survey. It is only through the help of professionals like you that allows us to obtain information to advance technology-based educational outreach through Iowa State University Extension and Outreach. Thank you for participating in this study. I appreciate your cooperation.

Sincerely,

Cayla Taylor
Ph.D. Candidate
Agricultural Education and Studies

Follow-Up Email #3:

August 12, 2014

Good Afternoon,

Recently, you were sent an email asking you to respond to a brief survey about your experiences using eXtension – America's Research-based Learning Network™. Your responses to this survey are very important and will help in advancing the development of successful technology-based learning to enhance the quality of communications, education and outreach for Iowa State University Extension and Outreach.

If you have already completed the survey, I appreciate your participation. If you have not yet responded to the survey, we encourage you to take a few minutes and complete the survey. This is a short survey and should take no more than ten minutes to complete. Please click on the link below to go to the survey website (or copy and paste the survey link into your Internet browser).

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Your response is important. Getting direct feedback from Iowa State University Extension and Outreach professionals is crucial in improving the quality of our technology-based educational outreach. Thank you for your help by completing the survey.

Sincerely,

Cayla Taylor
Ph.D. Candidate
Agricultural Education and Studies
Iowa State University

Email Follow-Up #4:

August 19, 2014

Good Afternoon,

This is a busy time for Iowa State University Extension and Outreach faculty and staff. I am hoping you may be able to give about ten minutes of your time this week to help us collect important information for Iowa State University Extension and Outreach by completing a short survey.

If you have already completed the survey, I appreciate your participation. If you have not yet responded, I would like to urge you to do so today. The open survey period will soon be ending.

Please click on the link below to go to the survey website (or copy and paste the survey link into your Internet browser).

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Thank you in advance for completing the survey. Your responses are very important! Getting direct feedback from Iowa State University Extension and Outreach professionals is crucial to improving the quality of technology-based educational outreach.

Sincerely,

Cayla Taylor
Ph.D. Candidate
Agricultural Education and Studies
Iowa State University

Mailed Postcard-Contact #5:

August 26, 2014

Over the last few weeks a survey has been emailed to you because of your professional involvement with Iowa State University Extension and Outreach. You have been selected to participate in a research project about the perceptions, acceptance and value of eXtension–America's Research-based Learning Network™.

If you have already completed the survey, please accept my sincere thanks. If not, please complete the survey as soon as possible. I am especially grateful for your participation in this study.

The survey can be accessed at the following link: http://tinyurl.com/isuextsurvey

Thank you in advance for completing the survey. Your response is very important! Getting direct feedback from Iowa State University Extension and Outreach professionals is crucial to improving the quality of technology-based educational outreach for our organization.

Sincerely,

Cayla Taylor
Ph.D. Candidate
Agricultural Education and Studies, Iowa State University

APPENDIX C. IOWA STATE UNIVERSITY EXTENSION PROFESSIONALS' LOCATION OF EMPLOYMENT

Employment Location	*f*	%
Iowa State University Campus	113	32.1
County Extension Office	238	67.80
Adair	2	*00.56*
Adams	1	*00.28*
Allamakee	3	*00.85*
Appanoose	0	*0*
Audubon	0	*0*
Benton	1	*00.28*
Black Hawk	2	*00.56*
Boone	3	*00.85*
Bremer	2	*00.56*
Buchanan	3	*00.85*
Buena Vista	1	*00.28*
Butler	1	*00.28*
Calhoun	0	*0*
Carroll	1	*00.28*
Cass	3	*00.85*
Cedar	3	*00.85*
Cerro Gordo	4	*01.14*
Cherokee	3	*00.85*
Chickasaw	1	*00.28*
Clarke	1	*00.28*
Clay	3	*00.85*
Clayton	1	*00.28*
Clinton	1	*00.28*
Crawford	2	*00.56*
Dallas	4	*01.14*
Davis	1	*00.28*
Decatur	2	*00.56*
Delaware	3	*00.85*
Des Moines	2	*00.56*
Dickinson	6	*01.71*
Dubuque	5	*01.42*
Emmet	2	*00.56*
Fayette	2	*00.56*
Floyd	2	*00.56*
Franklin	4	*01.14*
Fremont	0	*0*
Greene	5	*01.42*

Grundy	1	*00.28*
Guthrie	2	*00.56*
Hamilton	3	*00.85*
Hancock	2	*00.56*
Hardin	2	*00.56*
Harrison	3	*00.85*
Henry	6	*01.71*
Howard	0	*0*
Humboldt	1	*00.28*
Ida	2	*00.56*
Iowa	2	*00.56*
Jackson	0	*0*
Jasper	1	*00.28*
Jefferson	0	*0*
Johnson	6	*01.71*
Jones	1	*00.28*
Keokuk	0	*0*
Kossuth	2	*00.56*
Lee	5	*01.42*
Linn	8	*02.28*
Louisa	1	*00.28*
Lucas	0	*0*
Lyon	1	*00.28*
Madison	3	*00.85*
Mahaska	5	*01.42*
Marion	4	*01.14*
Marshall	2	*00.56*
Mills	1	*00.28*
Mitchell	2	*00.56*
Monona	2	*00.56*
Monroe	3	*00.85*
Montgomery	2	*00.56*
Muscatine	3	*00.85*
O'Brien	2	*00.56*
Osceola	1	*00.28*
Page	2	*00.56*
Palo Alto	1	*00.28*
Plymouth	4	*01.14*
Pocahontas	1	*00.28*
Polk	13	*03.70*
Pottawattamie (East)	2	*00.56*
Pottawattamie (West)	2	*00.56*
Poweshiek	2	*00.56*
Ringgold	0	*0*
Sac	3	*00.85*
Scott	2	*00.56*

Shelby	4	*01.14*
Sioux	4	*01.14*
Story	8	*02.80*
Tama	1	*00.28*
Taylor	1	*00.28*
Union	1	*00.28*
Van Buren	0	*0*
Wapello	2	*00.56*
Warren	5	*01.42*
Washington	2	*00.56*
Wayne	2	*00.56*
Webster	3	*00.85*
Winnebago	1	*00.28*
Winneshiek	3	*00.85*
Woodbury	7	*01.99*
Worth	1	*00.28*
Wright	2	*00.56*
Out of State	0	*0*

Note. n=351.

APPENDIX D. INSTITUTIONAL REVIEW BOARD APPROVAL

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 12/12/2013

To: Cayla Taylor
Extention 4-H Building

CC: Dr. Gregory Scott Miller
206 E Curtiss Hall

From: Office for Responsible Research

Title: eXtension: An Assessment of Perceptions, Acceptance and Value in Iowa State University Extension and Outreach

IRB ID: 13-582

Study Review Date: 12/11/2013

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
  - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
  - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

  Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

  Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. **Only the IRB or designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

Please be aware that **approval from other entities may also be needed.** For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **An IRB determination of exemption in no way implies or guarantees that**

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